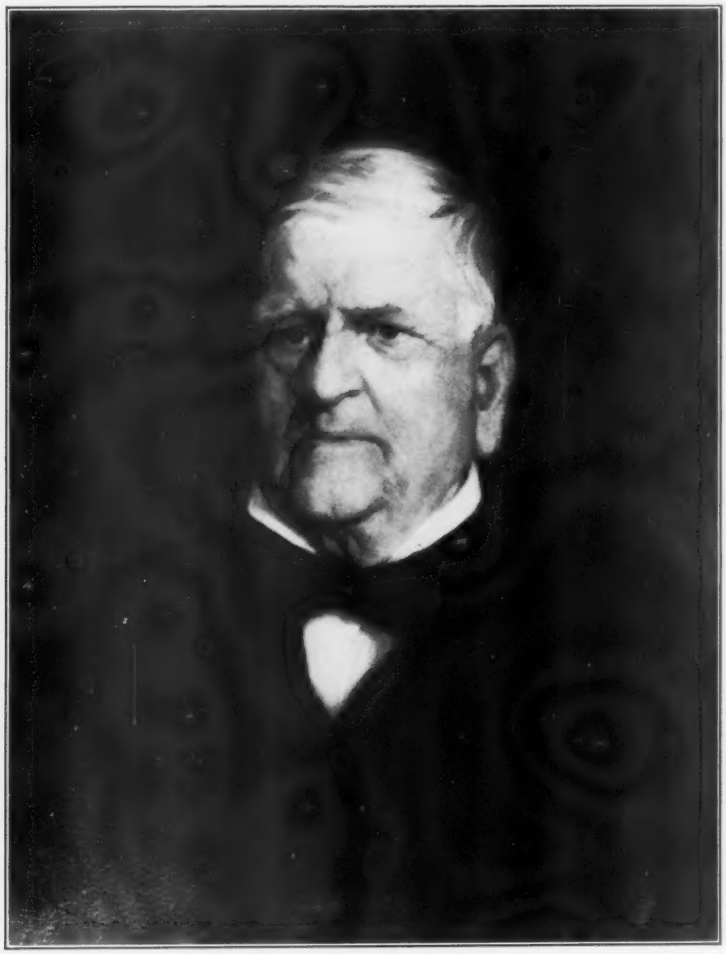
THE BULLETIN

OF THE

AMERICAN CERAMIC SOCIETY

Volume 18 JULY, 1939 Number 7



CAPTAIN J. B. FORD

For story, see page 262

Even Whistler

HAD HIS COLOR PROBLEMS

● Notwithstanding that famous and kindly portrait of his mother, Whistler also had his black moods and acid moments.

It was probably during one of these when he made his biting observation that "Mauve is just pink trying to be purple."

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THE BULLETIN OF THE AMERICAN CERAMIC SOCIETY

Volume 18 **July, 1939** **Number 7**

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Publication Office: 20th & Northampton Sts., Easton, Pa.
Editorial and Advertising Office: 2525 N. High St., Columbus, Ohio.
Executive Office: 2525 N. High St., Columbus, Ohio.
Committee on Publications: J. D. Sullivan, *Chairman;* E. E. Marbaker, A. N. Finn, W. W. Winship, Ross C. Purdy.

Entered as second-class matter at the post office at Easton, Pa., under the act of March 3, 1879. Published monthly.
Subscription $1.50 a year. Single numbers twenty-five cents.
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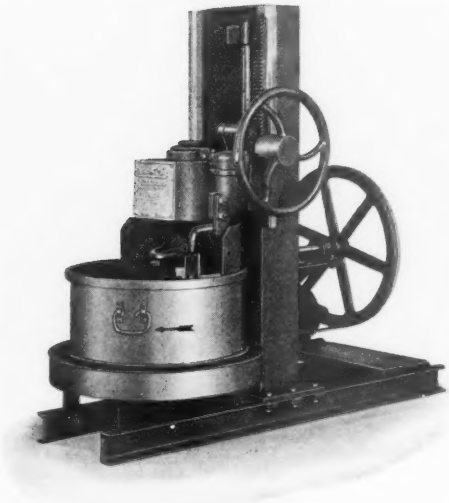

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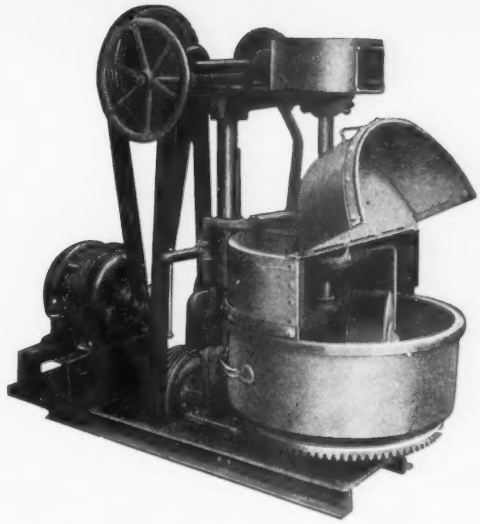

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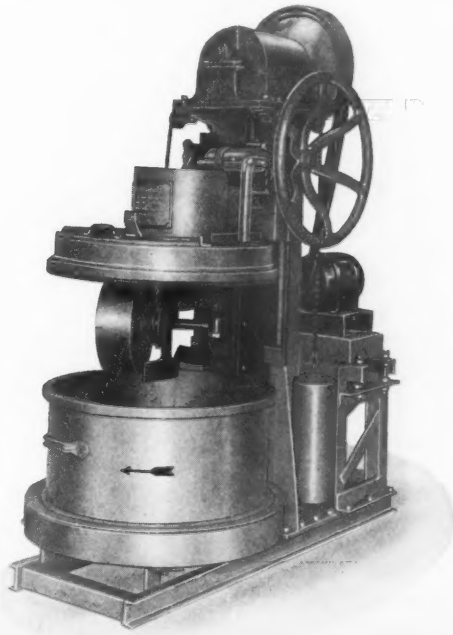

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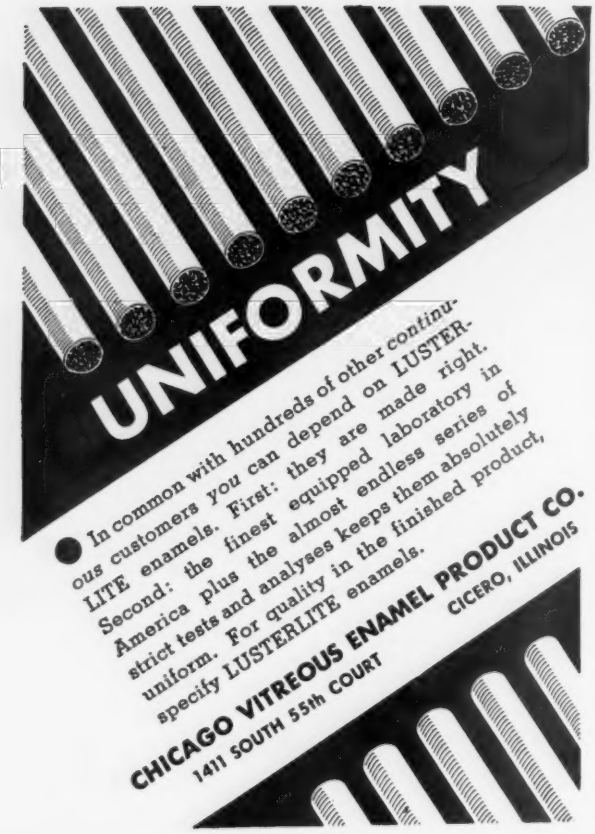
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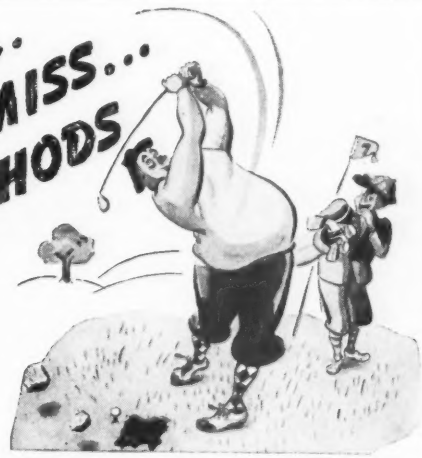

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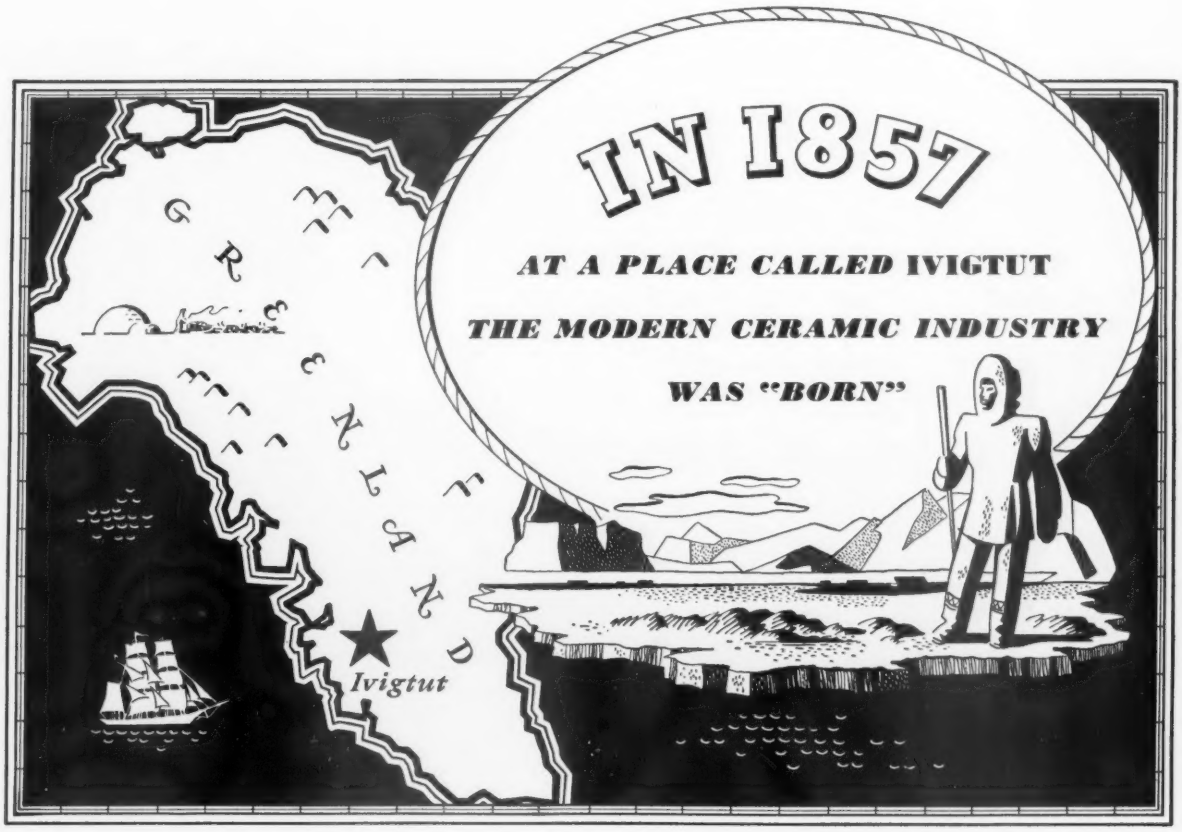

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HOW CHEMICAL RESEARCH CONTRIBUTES TO BETTER LIVING FOR AMERICA

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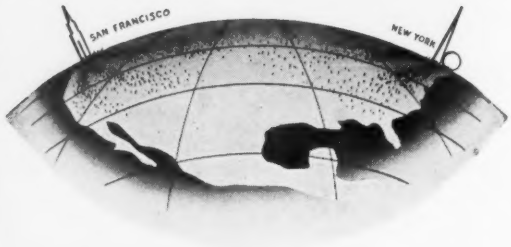

The two great World's Fairs—San Francisco and New York—with their dramatic presentations of the accomplishments of American genius and enterprise are more than educational exhibits. They provide inspiration out of which will come many new things for the world of tomorrow. At each of these fairs, du Pont is showing how modern applied chemistry is daily bringing new comforts, new opportunities for gainful employment, better things for living—tangible evidence that everybody benefits with chemical progress.

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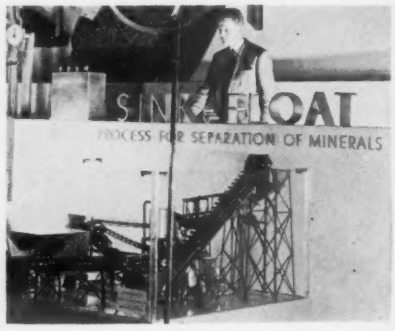
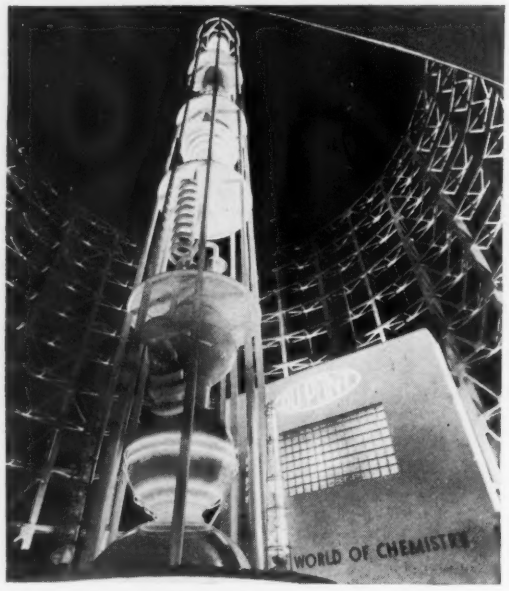
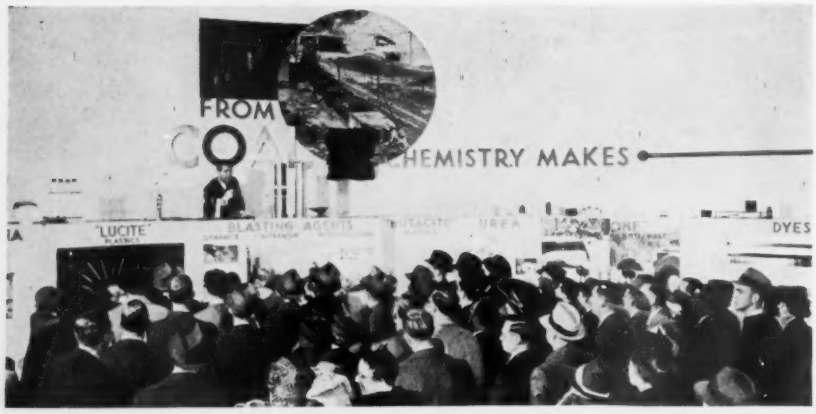


It took 34 years of research by chemists and chemical engineers to perfect the "Sink and Float" process for gravity separation of coal and minerals by means of chemical "parting liquids." Still in its infancy, the development marks a long stride forward for the mining industry.



The 107 ft. Chemical Tower at the entrance of the du Pont building, New York World's Fair, symbolizes modern applied chemistry and research.



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Norton Co.
Pennsylvania Salt Mfg. Co.

Ceramic Chemicals
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Metal & Thermit Corp.
Pennsylvania Salt Mfg. Co.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Cerium Oxide
Drakenfeld, B. F., & Co.

Chromium Oxide
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Clay (Ball)
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Paper Makers Importing Co.
Potters Supply Co.
Spinks, H. C., Clay Co.
The Vitro Mfg. Co.
United Clay Mines Corp.

Clay (Bentonite)
Wyodak Chemical Co.

Clay (Block)
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.

Clay (China)
Ceramic Color & Chemical Mfg. Co.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co.
The Vitro Mfg. Co.
United Clay Mines Corp.

Clay—Cleaners, Feeders
Lancaster Iron Works, Inc.

Clay (Electrical, Porcelain)
Ceramic Color & Chemical Mfg. Co.
Hammill & Gillespie, Inc.
The Hommel Co., O., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Old Hickory Clay Co.
Paper Makers Importing Co.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Clay (Enamel)
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Metal & Thermit Corp.
Paper Makers Importing Co.
Porcelain Enamel and Mfg. Co.
Spinks, H. C., Clay Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.
United Clay Mines Corp.

Clay (Fire)
Denver Fire Clay Co.
Maxson, Elwyn L.
Paper Makers Importing Co.
Potters Supply Co.
United Clay Mines Co.

Clay (German Vallendar)
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.

The Hommel Co., O., Inc.
Kentucky Clay Mining Co.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Clay (Micronized)
Porcelain Enamel and Mfg. Co.

Clay Miners
Maxson, Elwyn L.
Paper Makers Importing Co.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Clay (Potters)
Denver Fire Clay Co.
Hammill & Gillespie, Inc.
The Hommel Co., O., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Paper Makers Importing Co.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Clay (Process Equipment)
Lancaster Iron Works, Inc.
National Engineering Co.

Clay (Sagger)
Georgia Kaolin Co.
The Hommel Co., O., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Paper Makers Importing Co.
Potters Supply Co.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Clay-Slip (Albany)
Hammill & Gillespie, Inc.
United Clay Mines Corp.

Clay (Wad)
Kentucky Clay Mining Co.
Potters Supply Co.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Clay (Wall Tile)
Hammill & Gillespie, Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Old Hickory Clay Co.
Paper Makers Importing Co.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Cleaners
Pennsylvania Salt Mfg. Co.
Porcelain Enamel and Mfg. Co.

Cleaners, Chemical
Harshaw Chemical Co.
Pennsylvania Salt Mfg. Co.

Clocks (Gauge Board)
Chicago Vitreous Enamel Product Co.
The Hommel Co., O., Inc.

Cobalt Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Cobalt Sulphate
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Colors
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Concrete (Chutes, Grouters)
Ransome Concrete Machinery Co.

Cones
The Edward Orton, Jr., Ceramic Foundation

Conveying Equipment
Frazier-Simplex, Inc.
Lancaster Iron Works, Inc.
National Engineering Co.

Copper Oxide
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Corhart
Corhart Refractories Co.

Cornwall Stone (Imported)
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co.

Crucibles (Filter, Melting, Ignition)
Carborundum Co.
Denver Fire Clay Co.
Norton Co.
Potters Supply Co.

Crushers (Clay)
Lancaster Iron Works, Inc.

Cryolite (see Kryolith)
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Pennsylvania Salt Mfg. Co.
The Vitro Mfg. Co.

Crystolon (Refractory Products)
Norton Co.

Cullet, Washing Plants, Incinerators, Crushers
Frazier-Simplex, Inc.

Cutters (Bar)
Ransome Concrete Machinery Co.

Decorating Supplies
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Disintegrators
Lancaster Iron Works, Inc.
National Engineering Co.

Dryer (Pipe Rack)
Lancaster Iron Works, Inc.

Drying Machinery
Frazier-Simplex, Inc.
Lancaster Iron Works, Inc.
Proctor & Schwartz, Inc.

Electrocast Refractories
Corhart Refractories Co.

Enamelers' Borax
Porcelain Enamel and Mfg. Co.

Enameling Equipment (Complete)
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Frazier-Simplex, Inc.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Enameling Furnaces
Carborundum Co.
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Electro Refractories & Alloys Corp.
The Hommel Co., O., Inc.
Lancaster Iron Works, Inc.
Norton Co.

Enameling Iron (Sheet)
American Rolling Mill Co.
Bethlehem Steel Co.

Enameling Muffles
Bethlehem Steel Co.
Carborundum Co. (*Carbofrax*)
Chicago Vitreous Enamel Product Co.
Electro Refractories & Alloys Corp.
Frazier-Simplex, Inc.
Norton Co. (*Alundum*)

Enameling (Practical Service)
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
The Hommel Co., O., Inc.
Metal & Thermit Corp.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Enamels
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Enamel Oxide
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.

Enamels (Porcelain)
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Equipment (Porcelain Enameling)
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
The DeVilbiss Co.
The Hommel Co., O., Inc.

Exhaust Systems
The DeVilbiss Co.

Feldspar
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Filter Fabrics
Metakloth Company

Fire Brick
Carborundum Co.
Corhart Refractories Co.
Denver Fire Clay Co.
Norton Co.

Fire Brick—Process Equipment
Lancaster Iron Works, Inc.

Fire Clay
Denver Fire Clay Co.
Spinks, H. C., Clay Co.

Flint
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co.
Porcelain Enamel and Mfg. Co.

Flint Pebbles
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Floors (Non-Slip)
Norton Co.

Fluorspar
Harshaw Chemical Co.
The Hommel Co., O., Inc.

French Flint
Maxson, Elwyn L.
Paper Makers Importing Co.

Frit
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Frosting Mixtures
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Fuel Oil Systems and Control, Stokers
Bethlehem Steel Co.
Frazier-Simplex, Inc.

Furnaces
Carborundum Co. (*Carboradiant*)
Chicago Vitreous Enamel Product Co.
Denver Fire Clay Co.
Frazier-Simplex, Inc.
The Hommel Co., O., Inc.
Swindell-Dressler Corp.

Furnaces, Enameling
Swindell-Dressler Corp.

Glass Bending Ovens, Glass Decorating Machines
Frazier-Simplex, Inc.

Glass Equipment
Hartford-Empire Co.
Lancaster Iron Works, Inc.

Glass Melting Tanks and Furnaces
Frazier-Simplex, Inc.

Glass Thickness Gauge
Bausch & Lomb Optical Co.

Glaze and Body Spar
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Glazes and Enamels
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Glaze Spar
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.

The Hommel Co., O., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co.

Goggles
The Hommel Co., O., Inc.
Willson Products, Inc.

Gold
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Gold Decorations
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
The Hommel Co., O., Inc.

Granulators
Lancaster Iron Works, Inc.

Grinding Wheels
Carborundum Co. (*Carborundum and Aloxite*)
Chicago Vitreous Enamel Product Co.
Norton Co. (*Alundum-Crystolon*

Hearths
Carborundum Co.
(*Carbofrax* heat treating)
Corhart Refractories Co.
Norton Co. (*Crystolon*)

Hearths (High Aluminous Clay, Electrically Sintered Aluminum Oxide, Silicon Carbide)
Carborundum Co.
Norton Co.

Hoppers (Floor, Tower)
Ransome Concrete Machinery Co.

Hose (Air and Fluid)
The DeVilbiss Co.

Hydrofluoric Acid
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Iron Chromite
Harshaw Chemical Co.

Iron (Enameling)
American Rolling Mill Co.
Bethlehem Steel Co.

Iron Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Kaolin
Ceramic Color & Chemical Mfg. Co.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co.
United Clay Mines Corp.
The Vitro Mfg. Co.

Kilns, China (Decorating)
Denver Fire Clay Co.
Drakenfeld, B. F., & Co.
Frazier-Simplex, Inc.
The Hommel Co., O., Inc.
Swindell-Dressler Corp.

Kilns- (Electric, Circular, Tunnel)
Swindell-Dressler Corp.

Kiln Furniture (Silicon Carbide, Semi-Silicon Carbide) (Refractory)
Louthan Mfg. Co.

Kyanite
Celo Mines, Inc.

Kryolith (see Cryolite)
Pennsylvania Salt Mfg. Co.

Laboratory Ware
Norton Co.

Lehr Tile (High Aluminous Clay, Electrically Sintered Aluminum Oxide, Silicon Carbide)
Carborundum Co.

Lehrs
Frazier-Simplex, Inc.
Swindell-Dressler Corp.

Lehrs (Electric or Fuel Heated)
Frazier-Simplex, Inc.
Swindell-Dressler Corp.

Lehr Loaders
Frazier-Simplex, Inc.

Linings (Furnace Refractory, Block Refractory Plate, Brick, and Tile)
Carborundum Co.
Chicago Vitreous Enamel Product Co.
Corhart Refractories Co.
Denver Fire Clay Co.
Norton Co.
The Vitro Mfg. Co.

Lithium Carbonate
Drakenfeld, B. F., & Co.

Loaders (Bucket)
National Engineering Co.

Magnesia (Fused)
Norton Co.

Magnesia (Sintered, Calcined)
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.

Magnesite
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Magnesite Calcined
The Hommel Co., O., Inc.

Magnesium Carbonate
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Manganese
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Manganese Dioxide
Drakenfeld, B. F., & Co.

Manganese (Oxide)
Ceramic Color & Chemical Mfg. Co.
Corhart Refractories Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Masks (Breathing)
The DeVilbiss Co.
Drakenfeld, B. F., & Co.
Willson Products, Inc.

Metals (Porcelain Enameling)
American Rolling Mill Co.
Bethlehem Steel Co.

Micronized Products
Porcelain Enamel and Mfg. Co.

Microscopes (Polarizing)
Bausch & Lomb Optical Co.

Minerals
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Mixers
National Engineering Co.
Ransome Concrete Machinery Co.

Mixers (Batch)
Lancaster Iron Works, Inc.
National Engineering Co.

Mixers (Concrete, Paving, Road Paving, Plaster, Asphalt, Truck, Mortar, Bituminous)
Lancaster Iron Works, Inc.
Ransome Concrete Machinery Co.

Mixers (Laboratory)
Lancaster Iron Works, Inc.
National Engineering Co.

Mold Sanders
Lancaster Iron Works, Inc.

Muffles (Furnace)
Carborundum Co. (*Carbofrax*)
Chicago Vitreous Enamel Product Co.
Denver Fire Clay Co.
Frazier-Simplex, Inc.
Norton Co.

Mullers (Batch)
Lancaster Iron Works, Inc.
National Engineering Co.

Muriatic Acid
Denver Fire Clay Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Pennsylvania Salt Mfg. Co.

Needle Antimony
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Nickel Salts
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Nitrates (Cobalt, Sodium)
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Nitre
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Norbide (Norton Boron Carbide)
Norton Co.

Olivine
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.

Opacifiers
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Metal & Thermit Corp.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Overglaze Colors
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.

Oxides
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Metal & Thermit Corp.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Palladium Decorations
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
The Hommel Co., O., Inc.

Pins
Chicago Vitreous Enamel Product Co.
The Hommel Co., O., Inc.
Louthan Mfg. Co.
Potters Supply Co.

Pins (Tile Setter)
Louthan Mfg. Co.

Placers (Concrete Pneumatic)
Ransome Concrete Machinery Co.

Placing Sand
United Clay Mines Co.

Platinum Decorations
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
The Hommel Co., O., Inc.

Polariscopes
Bausch & Lomb Optical Co.
Frazier-Simplex, Inc.

Porcelain Enameling Service (Practical)
American Rolling Mill Co.
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Porcelain Enamels
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Potters Wheels
Denver Fire Clay Co.

Potash (Carbonate)
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Solvay Sales Corp.
The Vitro Mfg. Co.

Producer Glass Plants
Frazier-Simplex, Inc.

Pug Mills
Lancaster Iron Works, Inc.

Pyrites (Natural Iron Sulphide)

The Hommel Co., O., Inc.

Pyrometer Tubes
Carborundum Co.
Montgomery Porcelain Products Co.

Pyrometer Tubes (Refractory and Hard Porcelain)
Denver Fire Clay Co.
McDanel Refractory Porcelain Co.
Montgomery Porcelain Products Co.
Norton Co.

Pyrometers (Optical, Radiation, Surface, Immersion, Needle)
Pyrometer Instrument Co.

Pyrometric Cones
The Edward Orton, Jr., Ceramic Foundation

Racks, Firing (Refractory)
Louthan Mfg. Co.

Raw Material Handling Equipment
Frazier-Simplex, Inc.
Lancaster Iron Works, Inc.

Refractometers
Bausch & Lomb Optical Co.

Refractories
Carborundum Co.
Corhart Refractories Co.
Denver Fire Clay Co.
Louthan Mfg. Co.
Norton Co.

Refractory Materials
Carborundum Co.
Chicago Vitreous Enamel Product Co.
Corhart Refractories Co.
Denver Fire Clay Co.
Louthan Mfg. Co.
Norton Co.
Titanium Alloy & Mfg. Co.

Respirators
Chicago Vitreous Enamel Product Co.
The DeVilbiss Co.
Drakenfeld, B. F., & Co.
The Hommel Co., O., Inc.
Willson Products, Inc.

Rutile
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Metal and Thermit Corp.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Saggers
Carborundum Co.
Norton Co.
Potters Supply Co.

Salt Cake
American Potash & Chemical Co.
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Pennsylvania Salt Mfg. Co.

Sandblast Helmets
Willson Products, Inc.

Sand Grinder and Sifters
Lancaster Iron Works, Inc.

Saponin
The Hommel Co., O., Inc.

Screening and Magnetic Separators
National Engineering Co.

Selenite of Sodium
Drakenfeld, B. F., & Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Selenium
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Setters (Tableware)
Louthan Mfg. Co.

Sheaves (Tower)
Ransome Concrete Machinery Co.

Sheets (Enameling Iron)
American Rolling Mill Co.
Bethlehem Steel Co.

Silica (Fused)
The Hommel Co., O., Inc.

Silicate of Soda
Ceramic Color & Chemical Mfg. Co.
Denver Fire Clay Co.
The Hommel Co., O., Inc.
Harshaw Chemical Co.

Silicon Carbide
Carborundum Co.
Norton Co.

Silicon Carbide Firesand
Carborundum Co.

Sillimanite Refractories
Denver Fire Clay Co.

Slabs (Furnace)
Carborundum Co.
Norton Co.

Soda Ash
American Potash and Chemical Corp.
Ceramic Color & Chemical Mfg. Co.
Denver Fire Clay Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Pennsylvania Salt Mfg. Co.
Solvay Sales Corp.
The Vitro Mfg. Co.

Sodium Antimonate
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Metal & Thermit Corp.
The Vitro Mfg. Co.

Sodium Fluoride
Ceramic Color & Chemical Mfg. Co.
Denver Fire Clay Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Sodium Metasilicate
Harshaw Chemical Co.

Sodium Nitrite
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Sodium Silica Fluoride
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Sodium Uranate
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Soot Blowers
Frazier-Simplex, Inc.

Special Machines
Frazier-Simplex, Inc.

Spar
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co.
The Vitro Mfg. Co.

Spray Booths
The DeVilbiss Co.
The Hommel Co., O., Inc.

Spraying Equipment
The DeVilbiss Co.
The Hommel Co., O., Inc.

Spurs
Louthan Mfg. Co.
Potters Supply Co.

Stacks
Lancaster Iron Works, Inc.

Steel Plate Construction
Bethlehem Steel Co.
Lancaster Iron Works, Inc.

Stilts
The Hommel Co., O., Inc.
Louthan Mfg. Co.
Potters Supply Co.

Sulfuric Acid
Denver Fire Clay Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Pennsylvania Salt Mfg. Co.

Talc
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Paper Makers Importing Co.

Tanks
Frazier-Simplex, Inc.

Tank Blocks
Corhart Refractories Co.

Tanks (Pickle)
Chicago Vitreous Enamel Product Co.
The Hommel Co., O., Inc.

Tanks for Raw Material Steel or Concrete
Bethlehem Steel Co.
Lancaster Iron Works, Inc.

Tile (Floor)
Norton Co.

Tile (Muffle)
Carborundum Co.
Norton Co.

Tile Setter Pins
Louthan Mfg. Co.

Tile (Refractory)
Carborundum Co. (*Carbofrax*)
Chicago Vitreous Enamel Product Co.
Denver Fire Clay Co.
Norton Co.

Tile (Wall)
Denver Fire Clay Co.

Tin Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
The Hommel Co., O., Inc.
Metal & Thermit Corp.
The Vitro Mfg. Co.

Titanium
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Titanium Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Metal & Thermit Corp.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Towers (Concrete, Concrete Elevating, Steel Elevating)
Ransome Concrete Machinery Co.

Tri Sodium Phosphate
Harshaw Chemical Co.

Trucks
Lancaster Iron Works, Inc.

Tubes (Insulating)
Carborundum Co.
Louthan Mfg. Co.
McDanel Refractory Porcelain Co.
Norton Co.

Tubes (Pyrometer)
Carborundum Co.
Denver Fire Clay Co.
McDanel Refractory Porcelain Co.
Montgomery Porcelain Products Co.
Norton Co.

Uranium Oxide
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.

Uranium Oxide (Yellow-Orange-Black)
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Water Softening Plants
Frazier-Simplex, Inc.

Wet Enamel
Ceramic Color & Chemical Mfg. Co.
Chicago Vitreous Enamel Product Co.
The Hommel Co., O., Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Whiting
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Paper Makers Importing Co.
The Vitro Mfg. Co.

Winding Drums
Lancaster Iron Works, Inc.

Zinc Oxide
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Zircon
The Hommel Co., O., Inc.

Zirconia
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
Metal & Thermit Corp.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Zirconium Oxide
The Hommel Co., O., Inc.

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THE BULLETIN
OF THE AMERICAN CERAMIC SOCIETY

A Monthly Publication Devoted to Proceedings of the Society and Promotion of Coöperative Research of Technical, Scientific, and Art Questions

Volume 18 **JULY, 1939** **Number 7**

GOLDEN GATE MEETING, AMERICAN CERAMIC SOCIETY SAN FRANCISCO, CALIF., AUGUST 6–12 SCHEDULE OF TECHNICAL SESSIONS

Monday, August 7, 1939: 6:30 P.M.

Dinner Meeting on Treasure Island

Speaker: Atholl McBean, Gladding, McBean, & Co., San Francisco, Calif.

Tuesday, August 8, 1939: 10:00 A.M.–12:30 P.M.

Palace Hotel

President's Welcome Address, "Developments in Ceramics"

By Andrew I. Andrews: Dept. of Ceramic Engineering, Univ. of Illinois, Urbana, Ill.

The developments in ceramics during the past decade have been extensive and, in many cases, spectacular. In every phase of the ceramic industry, progress has brought forth new and better processes. The improvement in control and the application of science and engineering have effected many changes. The industry is justly proud of the progress it has made and is looking forward to many more developments.

This address deals with the recent developments in the different branches of ceramics, pointing out the progress which has been made and the present trends.

1. Progress Report on the Warpage of Plates

By Hewitt Wilson and Staff: Electrotechnical Lab., Bureau of Mines, Norris, Tenn.

A report is presented on the coöperation between the Tennessee Valley Authority and the U. S. Bureau of Mines.

This discussion covers different types and possible causes of warpage from the mold to the kiln. An indicating and recording instrument for measuring rim warpage is described, and the warpage obtained from a large number of commercial hotel plates is given. The experiments to control warpage were devoted mainly to (*a*) trueness of mold and jigger operation, (*b*) granular particle bedding in comparison with setter and ring placing, and (*c*) uniformity of firing.

2. Methods of Body Preparation and Their Effect on Dust Pressing of Wall Tile

By R. F. Evans: Gladding, McBean, & Co., Los Angeles, Calif.

The effect of various commercial methods of body preparation on a number of typical body compositions in relation to their effect on pressing behavior, density, and laminations is discussed. The method of preparation also has a material effect on such fired properties as shrinkage, porosity, and strength.

3. Plant Control of Raw Materials and Finished Products

By B. M. Burchfiel: Gladding, McBean, & Co., Los Angeles, Calif.

Practical methods of determining suitability and maintaining uniformity of raw materials in certain Pacific Coast plants are described as they apply both to whiteware and heavy clay products. The idea of cheap but adequate tests is stressed. A systematic method of looking constantly for trouble and its sources is presented. This is to the end that losses may be entirely prevented as far as possible and kept to a minimum by prompt correction when they occur and that uniformity of finished products may be maintained.

4. The Edward Orton, Jr., Ceramic Foundation, a Foundation for Research and Cone Manufacture

By George A. Bole: Edward Orton, Jr., Ceramic Foundation, Columbus, Ohio

The establishment of the Edward Orton, Jr., Ceramic Foundation is briefly described, and the work of fellowships is outlined.

The theory of cone deformation is commented upon. Frozen cones and the researches leading toward a remedy of the defect are discussed. Researches leading to the correction of bloated cones in the iron-bearing series are outlined.

Manufacturing researches leading toward dimensionally accurate cones are recounted. Plastic pressed (machine made) A.S.T.M. cones and improvements in the fabrication of handmade cones are examples.

Tuesday, August 8, 1939: 2:30–5:30 P.M.

Palace Hotel

5. Mat Glazes and the Lime–Alumina–Silica System

By Hewitt Wilson: Electrotechnical Lab., Bureau of Mines, Norris, Tenn.

Crystalline mat glazes whose important mat-forming constituents can be placed in the CaO–Al_2O_3–SiO_2 system are discussed. The types reviewed or developed in laboratory and commercial kilns are as follows:

(*a*) Al_2O_3–SiO_2, cones 28 to 42
(*b*) Al_2O_3–SiO_2–CaO, cones 13 to 15
(*c*) Al_2O_3–SiO_2–CaO–feldspar, cones 6 to 15
(*d*) Al_2O_3–SiO_2–CaO–feldspar–ZnO, cones 5 to 10
(*e*) Al_2O_3–SiO_2–CaO–PbO, cones 02 to 3
(*f*) Al_2O_3–SiO_2–PbO, cones 010 to 3

Anorthite appears to be the chief rapidly crystallizing mineral in most commercial mat glazes, although mullite is important in certain types of mat surfaces.

6. A Photomechanical Process for the Decoration of Tile and Other Flat Ceramic Ware

By Thomas S. Curtis: Thomas S. Curtis Laboratories, Huntington Park, Calif.

A simple and practicable method is described for applying decorations in quantity production to all manner of ceramic ware having a flat or substantially plane surface. The process is offered to the ceramic industry as a dedication and carries no license fees or royalties for its use.

7. Development of Selenium Red Glazes

By A. Lee Bennett: Gladding, McBean, & Co., Los Angeles, Calif.

The development of true (*i.e.*, somewhat translucent) ceramic glazes in pure orange shades is described. The study includes a discussion of the firing process and compositions. Beneficial and injurious glaze materials are enumerated. Successful ranges of glaze composition are given. Colors produced are classified by means of Ridgway's Color Standards and Nomenclature.

8. Spectral Transmission of Some Inorganic and Organic Glasses Containing Carbon in the Visible and Near Infra-Red

By Willi M. Cohn: University of California Extension Division, Berkeley, Calif.

Glasses of the formula $1.0\,Na_2O \cdot 2.0\,SiO_2$ were prepared. Various types of graphite, sugar coal, charcoal, bone black, and lampblack were added to the batches. The color of the glasses, caused by these additions and by various thermal treatments, was studied. X-ray tests were carried out in an attempt to establish a correlation between the crystalline structure and the coloring action of additions. Data are presented on the spectral transmission from 3600 to 10,000 Å of inorganic glasses containing carbon and of organic glasses of different thermal history.

Wednesday, August 9, 1939: 10:00 A.M.–1:30 P.M.

Palace Hotel

9. Progress Report on Bisque Firing of China by Electricity

By Hewitt Wilson and Staff

A discussion is given of the firing of thin, translucent, all-American hollow-ware china bodies, hotel plate bungs, and heavy sanitary ware with exposed silicon-carbide electric resistors. Studies were made of the effect of soaking on uniformity throughout a firing chamber, 19 by 27 by 30 in., determined by cones, pyrometers, body shrinkage, and absorption. The cost of electrical equipment and operation is compared with reported data for combustion firing.

10. Progress Report on Electric Heating Elements for Ceramic Firing to 1400°C

By Hewitt Wilson, M. S. Nelson, and Staff

Oxidation of the heated graphite resistors in silicon-carbide tubes has been reduced by better end seals and protection to the graphite terminal leads. A report is given of the gas permeability of the tubes at high temperatures and the use of gases other than propane and their pyrolysis at high temperatures. The experiments to eliminate the continuous application of propane gas to the interior of the protection tubes are described.

11. Little-Known Expansion Strains in the Initial Firing of Ceramic Ware

By John Moffat, Jr., and Guy E. Sievert: Tillotson Clay Products Co., Los Angeles, Calif.

In firing large pieces of ceramic ware, such as glass tank blocks, the investigators have endeavored to study the causes of cracking during the fire. Investigation of the thermal-expansion characteristics during the initial stages of the fire demonstrated to the authors the fact that relatively large strains occur at temperatures beyond the water-smoking period and extend through the oxidation period. The apparatus employed is a modified thermal-expansion equipment functioning with relatively large specimens of the actual body to be fired. The results of this investigation have been so successful that strains causing cracking and bloating of large masses of ware have been reduced to a minimum in the past few months. The method is equally applicable to the firing of all types of ceramic ware other than glass tank blocks. A description of the thermal-expansion apparatus employed is included in the paper.

12. Equations and Quadrant Charts for Determining Heat Balances of Kilns Using Solid or Liquid Fuels

By Kenneth G. Skinner: Northwest Expt. Station, Bureau of Mines, Seattle, Wash.

Equations are derived for determining heat balances of kilns using solid and liquid fuels, and quadrant charts are given for graphic solutions. Charts and equations are also given for determining the weight of air supplied, theoretical weight of air required for combustion, percentage of excess air, volume of moist air, weight of refuse, percentage of hydrogen and oxygen from the moisture- and ash-free basis to the as-fired basis, and heat content of fuel oils of different specific gravities. (Published in *Jour. Amer. Ceram. Soc.*, **22** [3] 72–82 (1939))

13. Progress in the Development of Kiln Furniture

By Clifford E. Tillotson: Tillotson Clay Products Co., Los Angeles, Calif.

The causes of warpage and cracking in kiln furniture, especially in rapid-cycle, low-fire kilns have been studied with encouraging results in the compounding of special bodies which the author describes in his paper. An extensive case history is included, giving actual results obtained in the commercial utilization of the new product

Thursday, August 10, 1939: 10:00 A.M.–1:30 P.M.

Palace Hotel

14. The Series Iron Oxides–Lime

By W. J. Crook: Dept. of Metallurgy, Stanford Univ., Stanford University, Calif.

The literature in general shows a considerable divergence of opinion regarding the basicity of the ferrite formed in steelmaking slags. Evidence is presented which indicates that when mixtures of iron oxide and lime are melted under oxidizing conditions in contact with metallic iron, a ternary system between CaO–FeO–Fe_2O_3 prevails and that the compound formed between lime and ferric oxide has the composition $3CaO \cdot Fe_2O_3$, except possibly for melts containing somewhat less than 10 mol. % CaO. A eutectic was found between FeO and $3CaO \cdot Fe_2O_3$, which contains

approximately 40 mol. % CaO. It is believed that when basic steelmaking slags are considered, the ternary system CaO–FeO–Fe_2O_3 should be substituted for the binary system CaO–Fe_2O_3, which has been used generally in the past.

15. The Series Iron Oxides–Silica

By W. J. Crook

A review is presented of the previous work by the writer on the general series FeO + Fe_2O_3 + SiO_2 + CaO(MgO) as related to steelmaking slags, in which 12 quasi-quaternary mineral systems are formed. A "plane of partition" of the iron oxides (FeO and Fe_2O_3) is also shown to exist. A method is explained by which, having a partial analysis of a slag, the position of the slag in the representative tetrahedron may be found and the series of minerals formed may be determined.

The present paper is a study of the system iron oxides–silica under conditions of formation, with and without the presence of metallic iron. In the former case, two distinct eutectiferous series are formed, *i.e.*, (*a*) wüstite-fayalite and (*b*) fayalite-tridymite. The reducing power of metallic iron is so great that substantially the same proportions of FeO and Fe_2O_3 are obtained when melting is conducted either under strongly oxidizing conditions or in a neutral atmosphere. A "eutectoid" between magnetite and tridymite contains equal molecular proportions of SiO_2 and Fe_3O_4. When iron oxide and silica are heated at 1600°C or higher in siliceous crucibles, the resulting melts consist essentially of tridymite and magnetite, forming an entirely different series than that obtained by melting in the presence of metallic iron. In connection with both series of melts, ferric oxide exhibits a much greater affinity for ferrous oxide than for silica.

16. Development and Some Preliminary Studies of Pinite, a Rock Composed of Hydrous Aluminum Silicates

By Vernon R. Sullivan: Stockton Fire Brick Co., San Francisco, Calif.

A deposit of a soft talc-like rock called pinite, composed of hydrous aluminum silicates, has recently been found in South American Canyon, on the east side of the Humboldt Range, near Rochester, Nevada. Prospecting and development of the deposit have consisted of trenching, open-cut work, and subsequent removal of sufficient tonnage to show a large zone of uniform material.

Refractories have been produced and placed in selected applications. The results obtained from tests with pinite indicate a superiority over other refractories in certain types of service.

Pinite inverts readily to mullite. Firing is accompanied by a permanent expansion. Thermal expansion curves show an absence of free silica. Pinite has a high specific gravity and fires extremely hard and white. When fired, it is highly resistant to certain types of fluxes and to abrasion.

Products have been made by the stiff-mud and casting processes. Pinite refractories have been used in rotary enamel smelting furnaces and in the cold zone and cooler linings of rotary cement, lime, and magnesite kilns.

17. Review of Four Years' Research on the Refractory Properties of Pacific Northwest Olivine

By Hewitt Wilson and Kenneth G. Skinner: University of Washington, Seattle, Wash.

A review is presented on the coöperative research of the United States Bureau of Mines and the College of Mines, University of Washington. This discussion covers a study of the refractory properties of the olivine from two large deposits in Washington. The research was devoted mainly to (*a*) physical, chemical, and mineralogical properties, (*b*) effect of chemical additions, (*c*) development of the densest and most refractory body, (*d*) manufacture of brick, (*e*) comparison of these brick in P.C.E., spalling, load test, absorption, and resistance to basic slags with other brick, and (*f*) local use of olivine as a foundry sand.

18. Method of Determining Heat-Shock Resistance of Refractories

By David E. Tomkins and Gordon Klein: New Castle Refractories Co., New Castle, Pa.

A new method of determining the heat-shock resistance of refractory products is outlined and discussed with the presentation of data on refractories of widely different physical properties. The method consists in heating the central axis of a cylindrical test specimen and taking time-temperature readings until rupture occurs. The test takes less than an hour and automatically correlates such physical properties as modulus of rupture, modulus of elasticity, fiber extensibility, thermal expansion, thermal conductivity, and porosity into useful thermal-strain resistance data. The discussion brings out the fact that thermal expansion and thermal conductivity are not always important.

Friday, August 11, 1939: 10:00 A.M.–1:30 P.M.

Palace Hotel

19. Clay Deposits of California

By W. F. Dietrich: Teacher of Mining and Metallurgy, Sacramento Junior College, Sacramento, Calif.

The present status of clay mining in California is reviewed and the development of ceramic raw materials since the publication of a comprehensive survey in 1928 is summarized. The clay-producing regions at Alberhill, Lincoln, and Ione continue to provide the greater part of the high-grade clays used in California industries, with but minor changes in the varieties of clay produced. The most important of the newer developments are the successful exploitation of flint fire clay from the Claymore property of the Gladding, McBean, & Co.; the extensive utilization of decomposed rhyolites and trachytes from the Hart Mountain and other deposits; and the substitution of talc in pottery and semivitrified, white tile bodies in place of china clay.

20. Flint Clays and Flint-Clay Refractories of Southern California

By B. M. Burchfiel and Henry Mulryan: Gladding, McBean, & Co., Los Angeles, Calif.

The occurrence and geology of the flint clays of Orange County, California, are described. As far as is known, these deposits are unique in the Far West. Technical data both on the clays and refractories produced from them are given and discussed, and various uses are mentioned.

21. A Pinitized Tuff of Ceramic Importance

By Paul F. Kerr: Dept. of Geology, Columbia Univ., New York, N. Y.

A pinitized zone forming a soft, dense, grayish rock of uniform texture which fires to snow-white mullite has been found on the eastern side of the Humboldt Range near Rochester, Nev. A tuff, apparently originally trachytic, has been extensively pinitized by processes of hydrothermal metamorphism with the result that a considerable area, as indicated by trenches and pits, has been more or less uniformly altered.

The products of alteration have been studied optically, chemically, and by means of X-rays. The chief alteration mineral is fine sericite. Associated with the sericite are minute crystals of aluminosilicate minerals including pyrophyllite. Silicification occurs around the margins of the pinite zone.

The mixture of sericite and minor associates forms a rock which, on firing, changes to mullite. The products of calcination of numerous samples of the Nevada pinite were compared with those secured by firing samples of sheet muscovite and sericite from various localities. Muscovite, on being fired at similar temperatures, produces a crystalline compound differing from mullite. Some sericite, not containing associated aluminosilicate impurities upon calcination, has been found to yield the same product as muscovite. Other sericite found in association with pyrophyllite yields mullite on calcination. It is possible that intimately mixed aluminosilicates including pyrophyllite are responsible for the different refractory behavior of the Nevada pinite.

Pinite heretofore has been used both as a rock name and as a mineral name. It has been realized for some time, however, that the mineral, pinite, is identical with the older sericite. It is herein concluded that a large and more or less uniform alteration zone of the type observed at American Canyon, which contains mineral constituents other than sericite, appears to justify the use of pinite as a rock name but not as a mineral name.

22. Summary of the Occurrence, Properties, and Uses of the Vermiculite Deposits at Libby, Montana

By W. Wurth Kriegel: Montana School of Mines, Butte, Mont.

Vermiculite is the name of a group of micaceous, hydrated silicates which are the alteration products of micas. The Libby mineral resembles jefferisite. Chemical analyses are given. The history of the deposits are briefly reviewed. The mineral occurs in a stock intruding the Algonkian Belt series of the valley. The vermiculite is mined by open pit methods, cleaned, crushed, screened, and trucked to the railroad for shipment to consuming centers where it is expanded by dropping through a vertical furnace operating at a temperature of 1400° to 1600°F. The principal use is in thermal insulation, but it is also being used for acoustical purposes. The coefficient of thermal conductivity varies between 0.26 and 0.35. The material has a P.C.E. value of 11. The coefficient of sound adsorption varies from 0.34 to 0.56.

23. Present-Day Technology of Adsorbent Clay

By George Schroter: Filtrol Co., Los Angeles, Calif.

An industry of national importance has been built around decolorizing clays. The author presents the highlights of the manufacture and use of such treated clays and presents a most interesting picture of the manifold uses of clay outside the ceramic field. Mr. Schroter is a geologist of distinction and is head of the department of exploration for the Filtrol Company which well qualifies him for the presentation of this interesting discussion.

24. Recent Investigations of the Clay Minerals

By Gustav Keppeler: Bodekerstrasse 64 II, Hannover IO, Germany

Samples of pure bentonite, kaolinite, and halloysite as shown by X-ray analyses as well as a plastic pottery clay were investigated. Typical isothermal dehydration and rehydration curves were developed for these materials. Differential temperature curves were made with the Saladin apparatus, showing the adsorption of heat around 100°C which was found to be greatest for the bentonites and smallest for the kaolin. Halloysite shows a second heat adsorption at 520°C, and kaolin, at 545°. Dehydration curves for the materials for the temperature range 20° to 600°C are shown. The property of thixotropy is discussed. "Flow pressures" for the kaolin, bentonites, and plastic pottery clay were measured for various times of standing after agitation. It was found that bentonites are strongly thixotropic and are affected by the p_H values of the slip. The pottery clay showed thixotropic effects indicating the presence of bentonite. The kaolin did not show thixotropy. Surface properties of the clays are discussed with reference to those of other clays. The pottery clay exhibits properties that indicate the presence of bentonite despite the fact that the X-ray analysis showed it to be pure kaolin.

25. Dehydration and Rehydration Study of Certain Clays

By W. Wurth Kreigel and Charles W. Dougan

Isobaric dehydration by increasing temperature at atmospheric pressure with subsequent isothermal rehydration at room temperature studies of 12 clays were made. When heated to temperatures from 110° to 1040°C, all the clays adsorbed water from a moist atmosphere and the kaolin, dickite, and bentonitic materials developed characteristic curves. Isothermal dehydration and rehydration studies at 25°C were made on 7 of the clays. Characteristic curves were developed for the different types of clays, which indicate that bentonite in small quantities is present in these ceramic clays.

DIVISION AUTUMN MEETINGS

ART

BLUE RIDGE, N. C., AUGUST 17–18, 1939

Program Arranged by Kenneth E. Smith

Thursday, August 17

Exhibition of Pottery supplied by Newcomb School of Art, Newcomb College, New Orleans, La.

Forenoon: Lectures by Jack Smoot, Habersham College, Clarkesville, Ga., "National Youth Administration in Ceramic Art," and by Whitney Atchley, Director of Design, WPA, Washington, D. C., "Ceramic Art in the Works Progress Administration" (small exhibits from these projects will be shown).

Afternoon: Lectures and demonstrations by William Gordy, Georgia Art Pottery, Cartersville, Ga. (an exhibition of pottery to be included) and by Patricia Eakin, Electrotechnical Laboratory, Bureau of Mines, Norris, Tenn., "Modeling, Mold Making, and Casting."

Evening: Illustrated lecture, "Chinese Porcelain," by John A. Foster, Ford Motor Co., Detroit, Mich; motion picture by A. E. Baggs, Ohio State Univ., Columbus, Ohio, "Indian Pottery Making."

Friday, August 18

Forenoon: Discussion on "Bodies, Glazes, and Kilns" led by Kenneth E. Smith, Ceramic Art Dept., Newcomb College, New Orleans, La.

"Construction and Operation of Ground-Hog Type Kilns for Camp and Studio Potters," by Converse Harwell, Pinewood Pottery, Fairhope, Ala.

Mr. Harwell is using the ground-hog type of kiln in his pottery and is doing some interesting glaze work at cone 10 with wood as fuel.

Time will be given on Thursday afternoon and Friday morning for Institute visitors to see the actual making, glazing, and firing of small pieces of pottery.

Come by Train or Motor

Blue Ridge is fifteen miles east of Asheville and two miles from Black Mountain, the railway station. Located on North Carolina Highway No. 10 (U. S. Highway No. 70).

Modest Rates

Although every comfort and modern convenience is available at Blue Ridge, the rates are very modest. Room

rates vary from $1.00 without bath to as high as $2.50 with bath. One may have meals in a splendid cafeteria as low as $1.00 per day or the best of hotel service at $2.00 per day.

GLASS DIVISION

Date: September 8, 9, and 10.

Place: Skytop Club, Skytop, Pa., located in the Pocono Mountains about 100 miles from New York, N. Y., and Philadelphia, Pa.

Transportation: Either Lackawanna or Pennsylvania railroads to Cresco where Skytop busses meet the trains.

This will permit those who are planning to attend the World's Fair to arrange their itinerary to include the Glass Division Autumn Meeting.

ENAMEL DIVISION

October 18 to 20, Columbus, Ohio, Deshler-Wallick Hotel: Porcelain Enamel Institute Fourth Annual Forum. (For details of this meeting, see this issue, p. 268.)

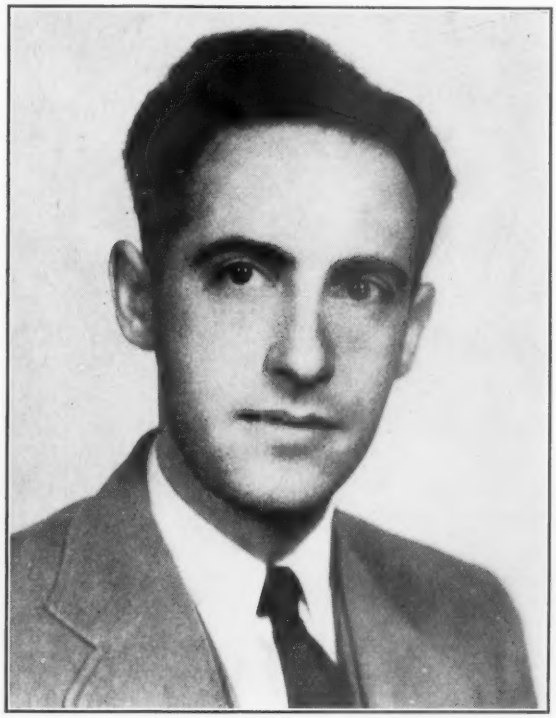
REFRACTORIES DIVISION

The Refractories Division will hold its Autumn Meeting at the Oakland Beach Hotel, Conneaut Lake, Pa., Friday and Saturday, September 8 and 9, 1939. The Friday session will be devoted to special refractories in the nonferrous industry, and at the Saturday session special refractories in the steel industry will be discussed. At both sessions, the majority of the papers given will come from the consumer group, carrying out the idea of the past two years of giving the consumers of refractories an opportunity to air their views.

The management of the Hotel has assured ample meeting facilities without charge. A registration fee of $1.00 will be charged for the men; there will be no fee for the ladies.

—SAM WALTON, *Chairman*

TWO OF OUR AUTUMN MEETING LEADERS



Kenneth E. Smith, Art

N. W. Taylor, Glass

A Heap of Living Makes the Home
A Heap of Study and Unremitting Work Brings Success
A Faint Heart Never Achieves
He Succeeds Who Determines So to Do

It Is Only by Communication with Others That Knowledge Is Acquired; Membership in The American Ceramic Society Is Opportunity for These Achievements

ACTIVITIES OF THE SOCIETY

DISCUSSION OF METHODS OF ANALYSIS OF SILICATES AND SILICATE PRODUCTS

Sponsored by the Committee on Analytical Procedures. Notes on the meeting of this Committee held during the Forty-First Annual Meeting, American Ceramic Society, Chicago, Ill., April 20, 1939

Chairman E. W. Koenig, Consolidated Feldspar Corp., called on different members of the Committee to lead the discussion on various phases of analytical procedure used in the ceramic industry.

G. E. F. Lundell, National Bureau of Standards, presented a discussion on the use of perchloric acid for the determination of silica. He stated that from dozens of analyses on a borosilicate glass, analyzing from 69.24 to 69.91% silica, the perchloric method was efficient for this type of silicate analysis.

The partition method for boric oxide was discussed, and A. N. Finn of the Bureau gave figures on its accuracy and limits, *e.g.*, 12½ to 15% B_2O_3 may be determined by this method; he will furnish definite information to those who request it.

In the discussion on the use of perchloric acid in the analysis of feldspar, Mr. Koenig stated that there was a 2-mg. loss in the Pyrex-brand beaker caused by boiling perchloric acid in the beaker. Dr. Lundell, as well as several other members of the group, questioned whether alumina or B_2O_3 goes into solution from the beaker. Mr. Koenig replied that SiO_2 goes into solution and contaminates the alumina precipitate. Repeated tests at the Ferro Enamel laboratories, using the perchloric acid, have resulted in a close check with the Bureau of Standards analyses on standard samples of soda and potash feldspar. Dr. Lundell enumerated several advantages of the determination of sodium by the triple-acetate method. This method, which seems to be highly accurate, especially in umpire analyses, will be investigated further. Sodium oxide as high as 16.76 to 16.88% has been determined to a precision of 0.044%.

Dr. Lundell also discussed the Hicks method for the determination of potassium.

A discussion on the use of 8-hydroxyquinoline for the volumetric determination of aluminum and magnesium showed these methods to have much in their favor because they are rapid and accurate.

A. N. Finn indicated that for routine analysis of feldspar, instead of using a fusion method for the decomposition of the feldspar, a sintering process in which ½ gram of feldspar is mixed with 0.2 gram of sodium carbonate in place of ½ gram of sodium carbonate. This mixture should be made thoroughly homogeneous, placed in a furnace at 800° to 850°C, and sintered for a definite time, which may be determined by experiment. The sintered mass may be taken out directly with perchloric acid and dehydrated without the preliminary use of hydrochloric acid to put the mass into solution. This seems to be a rapid method for silica in feldspar. The Bureau will give details on this method to those who wish to run check tests.

J. E. Boyd, Minpro Feldspar Corp., uses a single dehydration method for the determination of silica in feldspar. Fusions are made in a platinum dish instead of a platinum crucible, followed by a single evaporation in hydrochloric acid. The temperatures are controlled to about 110° to 120°C in the final baking, and the silica is filtered off and washed in the regular way. This method checks well with the Bureau of Standards samples.

C. M. Nicholson, Canadian Nepheline, Inc., advocates the following method for the determination of iron by the use of ceric sulfate. About ½ to 1 gram of the sample is fused with a mixture of 3 parts sodium carbonate and 1 part borax, using a total flux content of 8 grams to the ½- or 1-gram sample. When the sample is thoroughly dissolved in the molten flux, the mass is cooled, taken up either with sulfuric or hydrochloric acid, and passed through the Jones reductor. The reduced solution is titrated with ceric sulfate, using a special organic indicator (orthophenanthroline ferrous complex), and accurate results for iron are obtained. Mr. Nicholson will send a complete detailed report of this method with a description of the apparatus used and the technique which is to be followed to get accurate results.

Referring to the work of the Committee on Enamel Methods of Standardization, it was the consensus of opinion that the methods should be written up in the same manner used by the A.S.T.M. Several ways should be given to determine different ingredients, and the degree of accuracy which may be obtained by the different methods should be stated. A sample on which a dozen analyses will be run should be sent to one of the coöperating companies. A dozen other laboratories, if possible, should get samples and run their regular chemical analysis on the material. Upon compiling these data, it will be possible to determine how closely an individual laboratory can check with the true percentage.

The Titanium Alloy Company uses the Jones reductor method to determine titanium; they titrate the reduced titanium with a standard solution of ferric ammonium sulfate and obtain results which are accurate to 0.05%. About 200 determinations are run every day by this method.

Mr. Koenig distributed copies of a paper on determination of potassium oxide in feldspar. His method is highly accurate.

Methods in the analysis of refractory materials were discussed briefly by Dr. Lundell.

The use of bromate in volumetric analysis was also discussed. The potentiometric titration of hydroxyquinoline is useful in the titration of magnesium oxyquinolate and is regarded to be accurate to a high degree.

This Committee is greatly indebted to Dr. Lundell for his genuine interest in its work and in the many chemical problems in relation to the ceramic industry. He, with his staff at the Bureau, will be glad to coöperate with members in any manner possible.

The meeting was informal, and all persons attending took part in the discussion. Such meetings are helpful because small points of technique and handling may be questioned immediately by other members.

—M. Bozsin

MINUTES OF THE NINTH ANNUAL MEETING OF FELLOWS OF THE AMERICAN CERAMIC SOCIETY

(1) A quorum being present, the meeting was called to order by Dean Paul E. Cox at 4:00 P.M., April 16, 1939, at the Stevens Hotel, Chicago, Ill.

(2) The minutes of the Eighth Annual Meeting of March 28, 1938, held at New Orleans, having been distributed to the members in mimeographed form, the reading of these minutes was dispensed with by consent of those present.

(3) Dean Cox read the report of activities for the year. The report of the Secretary-Treasurer was read. A motion to accept the report was carried.

Reports of Committees

(4) M. E. Holmes stated that a report on ceramic education was to be prepared and submitted later.

(5) F. H. Norton reported that a Committee on Ways and Means to finance activities of the Fellowship had

considered three alternatives, but the Committee had not been able to come to conclusions on which to base specific recommendations. The report was followed by some discussion of the problem of maintaining a working fund for the Fellowship program.

(6) J. W. Whittemore requested that the amount of $50.00 (appropriated last year but not yet used) for clerical service in the preparation of a report on Ceramic Engineering Curricula by the Ceramic Educational Council, be reappropriated for this purpose. A motion by Sharp, seconded by Watts, that the amount of $50.00 be reappropriated for this purpose was carried.

(7) Dr. Silverman stated that The Society has two representatives (Dr. Silverman on Chemistry and Chemical Technology and Dr. Sosman on Geology and Geography), appointed by the Board of Trustees, on the National Research Council. No provision has been made for presentation of reports by these representatives, and it was their desire to know whether or not the Fellows should receive reports for their files. Discussion followed without any action being taken.

(8) The report of the Committee on Honorary Membership was presented, recommending the election of A. S. W. Odelberg and Heinrich Ries. A motion by Silverman, seconded by Norton, that the Fellows approve the recommendations and nominate these men for election to Honorary Membership in The Society by the Board of Trustees was carried unanimously.

(9) Samuel Geijsbeek, a Charter member of The Society and of the Fellows, was introduced.

(10) The results of the election of officers of the Fellows for the ensuing year was announced by S. F. Walton, Chairman of Tellers. The following were elected to their respective offices and were duly installed: *Dean*, Samuel R. Scholes; *Associate Dean*, Edward Schramm; and *Secretary-Treasurer*, T. N. McVay.

(11) The meeting adjourned at 5:15 P.M.

CONSTITUTION OF THE CERAMIC CAMERA CLUB

Article I. Name

The official title of this organization shall be The Ceramic Camera Club with official office located at the residence of the Secretary-Treasurer of The Ceramic Camera Club.

Article II. Purpose

It shall be the purpose of this organization, hereinafter referred to as The Camera Club, to promote to a greater degree the art of photography among members of THE AMERICAN CERAMIC SOCIETY.

Article III. Membership

The membership of The Camera Club shall be limited to members of THE AMERICAN CERAMIC SOCIETY.

Article IV. Board of Governors

(1) The management of the affairs of The Camera Club shall be vested in a Board of Governors, consisting of five members from among whom there shall be elected a chairman and a secretary-treasurer.

(2) The term of office for these five governors shall be one year, to wit, from the close of one Annual Meeting of THE AMERICAN CERAMIC SOCIETY to the close of the next succeeding Annual Meeting of THE AMERICAN CERAMIC SOCIETY or until their respective successors have been elected and duly qualified.

(3) The Board of Governors shall have sole and exclusive power and shall be able

(*a*) To incur debt in the name of The Camera Club.

(*b*) To enter into contracts binding upon The Camera Club.

(*c*) To provide suitable space and equipment for exhibition purposes and/or annual dinners and meetings.

(*d*) To determine exhibition prices or membership rates.

(*e*) To enroll members, expel members, or reinstate members from time to time.

Article V. Meetings

(1) An Annual Business Meeting and Exhibit of The Camera Club shall be held during the Annual Meeting of THE AMERICAN CERAMIC SOCIETY at such time and place as the Secretary of THE AMERICAN CERAMIC SOCIETY shall determine. Notice of said meeting shall be given the membership either in writing or by publication in *The Bulletin of The American Ceramic Society* at least three months prior thereto.

(2) The number of members constituting a quorum at any meeting of The Camera Club shall be as provided in the By-Laws.

Article VI. Amendments

(1) Any voting member may propose amendments to this Constitution by filing a written petition with The Camera Club's Secretary, who shall immediately transmit it to each member of the Board of Governors.

(2) The members attendant at such Annual Meeting shall, by majority vote, determine whether such amendment shall be adopted, and in the event that two-thirds of the votes cast shall favor said amendment, it shall at once become effective.

BY-LAWS

Article I. Government

(1) The Board of Governors shall meet at least annually.

(2) A majority of the Board of Governors shall constitute a quorum. Thirty per cent of the membership enrollment shall constitute a quorum.

(3) Every question which shall come before a meeting of The Camera Club shall be decided by a two-thirds majority of the votes cast.

(4) Rules contained in Robert's Rules of Order, Revised, shall govern The Camera Club in cases to which they are applicable, when not inconsistent with the Constitution, By-Laws, or Rules of The Camera Club.

Article II. Membership

(1) Any member of THE AMERICAN CERAMIC SOCIETY who shall have paid his or her current camera club dues or the Annual Exhibit fees and shall have complied with the following rules shall be a member of The Ceramic Camera Club, and also,

(*a*) Members may submit four prints for exhibition purposes yearly for the Annual Exhibit.

(*b*) Prints submitted by members may be finished and printed by commercial establishments, but the negative must be exposed by the member.

(*c*) All prints submitted must be mounted for exhibition purposes on 16- by 20-inch vertical mounts either on suitable standard white- or buff-colored cardboard.

(*d*) Any type of camera may be used, and prints may be submitted in black and white, in color, or in any accepted photographic method except that known as hand coloring.

(*e*) Prints must bear title names on left bottom corner below print on mount, and maker's name on right bottom corner below print. Name and address of owner must appear on back of mount.

(*f*) There is no time limit in which photographs may be taken, but they can be submitted only once to The Camera Club for exhibition.

(2) Prints for the Annual Exhibit should be mailed directly to the city and hotel where the Exhibit is to be held, advising the Secretary of the Camera Club the title name of the prints and number being submitted. After the Exhibit closes all prints will be returned. Care will be given all prints in handling, exhibiting, and returning to members.

Article III. Exhibit

The Annual Exhibit of The Camera Club shall be held in some suitable room or rooms in the headquarters hotel of THE AMERICAN CERAMIC SOCIETY at the time of the Annual Meeting of THE AMERICAN CERAMIC SOCIETY.

Article IV. Dues

The dues of The Camera Club shall be based on membership numbers, but it shall not be less than $3.00 per member per year. This amount shall be expended yearly for notices, postage, and exhibition purposes.

Article V. Classifications

(1) The general divisions of The Camera Club for exhibition judging purposes shall be as follows:

(*a*) Portrait
(*b*) Industrial
(*c*) Trade Paper
(*d*) Scientific
(*e*) Action
(*f*) Color
(*g*) Pictorial

Article VI. Judging

(1) The judging of all exhibitions of The Camera Club shall be made by a committee of two or more photographers selected by the Board of Governors from the city in which the Annual Exhibit is being held.

(2) The judging shall, as near as possible, be made in the classifications as outlined in Article V, and each classification may or may not receive one first prize award and one honorable mention award. One grand first prize award and two honorable mention awards for the Exhibit as a whole may be given.

(3) The findings of the judges shall at all times be final.

THE INSTITUTE OF CERAMIC ENGINEERS—ANNUAL REPORTS

REPORT OF THE PRESIDENT

Executive Committee

President: J. L. CARRUTHERS, Dept. of Ceramic Engineering, Ohio State University, Columbus, Ohio

Vice-President: H. G. WOLFRAM, Porcelain Enamel & Mfg. Co., Baltimore, Md.

Secretary: S. J. MCDOWELL, General Ceramics Co., Keasbey, N. J.

It is with a great deal of pleasure that I make this Report because I believe the accomplishments of the past year have already justified the existence of the organization.

Due largely to the amount of work with which the Executive Committee has been burdened, the membership has not been kept fully advised as to what was being accomplished, but this has been taken care of recently by the appointment of an editor who has prepared reports for the past three issues of *The Bulletin*. These monthly reports will continue.

Naturally the past year has been an extremely busy one for the presiding officer. Some idea of the work involved in putting the Institute on a going basis may be gathered from the number of letters that have been mailed from his office since April, 1938; the total to April 1, 1939, is 1008. This correspondence had to be taken care of in addition to regular work and cost the Institute nothing except the postage.

Committees were appointed as soon after the organization meeting last year as selections could be made. It was not expected that these committees would do a great deal more during the year past than to get organized and to develop programs and plans for their successors. All of these committees were working in fields that were new to ceramic engineers, and much time has been consumed in studying the programs of similar committees in other engineering societies.

The most important of these committees is the Committee on Membership and Examinations, of which A. S. Watts is Chairman.

Only one who has been in close touch with Professor Watts and his Committee members can appreciate the time and effort they have put into their difficult assignment. No doubt many of those who applied for membership could not understand why applications should be held up for months before being approved.

It should be remembered, however, that within a short time after the organization meeting in New Orleans and before the Committee was fully organized, approximately 100 applications were received, many of which did not contain all necessary information.

To begin with, the Committee had no established precedents and, in passing on each application, it practically established a precedent. This made it necessary to act cautiously. To make matters more difficult, few applicants carefully read the requirements for the various grades of membership before filling out their blanks, and as a consequence much unnecessary correspondence developed.

The Committee members could devote only their spare time to the study of the applications; furthermore, each application had to pass through the hands of all five members. After the Committee had passed on the applications, they were then required to pass through the hands of the five members of the Executive Committee for their approval.

Members who applied for the Member grade no doubt have been disappointed upon being notified of election to the Associate grade. This is a temporary expedient, and such members will be advanced as soon as they pass the required examinations.

The Committee has been occupied to such an extent with the rush of applications that it has not as yet had time to prepare examinations for those who are not otherwise eligible for the "Member" grade. It is expected these will be available in the near future.

It might be added that with experience it has been found possible to make a number of "short-cuts" in passing applications through the committees, and the work consequently will be speeded up in the future.

During the year, application was made to the Engineers' Council for Professional Development for representation of the Institute in that body. Members of the Council are the American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers, American Institute of Chemical Engineers, Society for the Promotion of Engineering Education, and National Council of State Boards of Engineering Examiners. The Institute is the first engineering society, not included in the original group, to attempt to obtain membership. Our application was considered at the annual meeting last October and after considerable discussion was referred to the Council's Executive Committee. It is probably too much to expect that we will receive favorable consideration on account of our youth and size, but there is nothing to prevent us from continuing to "knock on the door."

Whether the Institute is taken into membership or not, the E.C.P.D. has recognized it as the official organization of the ceramic engineers and is referring to it all matters pertaining to ceramic engineering. During the year, the Council requested the Institute to appoint one of its members to the examining committee which audited the Department of Ceramics at Penn State.

Application was also made for membership in the American Engineering Council and, in this instance, with success. This Council is composed of the Founder Societies and the various local engineering societies throughout the country. Election to membership in this organization gives to the Institute national recognition, and for the first time in the history of engineering, the ceramic engineers will have the name of their organization listed with those of the Founder Societies.

One of the most important accomplishments of the Institute has been to obtain recognition of ceramic engineering by a number of the State Boards of Engineering Examiners.

Up to within the past few years it would appear that few state boards had ever heard of ceramic engineering. The first successful effort to obtain classification and recognition was in Ohio. This was due to the combined efforts of The American Ceramic Society, the Department of Ceramic Engineering at The Ohio State University, and Keramos. Keramos then took up the battle single handed in other states, and during the two years previous to the organization of the Institute did a splendid job in laying the foundation for general recognition and classification.

During the past year, an intensive drive has been made on the forty states having licensing laws. In addition to attending the annual meeting of the National Council of State Boards of Engineering Examiners at Des Moines, Iowa, in October, a mimeographed bulletin was sent from the president's office to every member of every state board in the country. This bulletin briefly described the field of ceramic engineering, its history, the institutions in which it was taught, and the types of work in which ceramic engineers are engaged. It was accompanied by a letter requesting the boards to recognize, classify, and provide suitable examinations for ceramic engineers.

The response to our efforts has been encouraging, and to date the following states have agreed to grant professional licenses to ceramic engineers: Alabama, Arizona, Colorado (tentative), Connecticut, Florida, Georgia, Ohio, Tennessee, Illinois (to those who can qualify as structural engineers), Nebraska, Pennsylvania, Iowa, Kentucky, New York, North Carolina, Oregon, and Wisconsin.

A licensing bill is before the Missouri legislature at the present time and our Secretary, Professor Dodd, has seen to it that ceramic engineers will receive recognition under it. A bill is also before Congress which provides for licensing in the District of Columbia. Every effort is being made to have ceramic engineering specified as it is believed recognition in the District would influence state boards elsewhere.

The boards in a number of other states have the matter under consideration and it is expected a number of additions will be made within the next year. The remainder will have to be worked on until we obtain general recognition throughout the country.

These efforts with the state boards have resulted in some effective advertising for ceramic engineers.

An accomplishment of the Institute of which it can feel justly proud is the inclusion of ceramic engineering in the booklet, Careers in the Mineral Industries, edited by T. T. Read of Columbia University and financed by the American Institute of Mining and Metallurgical Engineers. This booklet describes the various branches of the mineral industries and the opportunities offered in each to young high-school gradua'es. It is to be distributed to 30,000 high schools throughout the United States. Through the close relationship that has been established between the A.I.M.M.E. and our Institute, ceramic engineering was included without any cost to us.

Through this booklet many young men throughout the country will learn of ceramic engineering for the first time. This is another piece of good advertising.

A specification for the official badge of the Institute was presented to manufacturing jewelers, and the design of Balfour and Company was accepted. A contract was made at reasonable prices, *e.g.*, $1.60 each for gold-filled and $4.25 for 10K solid gold The Institute receives 10% on all sales.

A majority of the members of other national engineering societies take pride in wearing their badges; members of the Institute should also, as ceramic engineering needs advertising far more than does civil, mechanical, chemical, and other branches and as it carries the titles of both of the ceramic organizations every member is urged to purchase and wear one. They must be ordered through the office of The American Ceramic Society.

The finances of the Institute are in excellent shape. The $2.00 assessment for 1938 was sufficient, with careful financing, to cover actual needs. The Trustees have appropriated $100 to the Institute for 1939.

The receipts from assessments during 1938 amounted to $326.10 and from royalties on badges, $0.43, a total of $326.53.

The disbursements for the same period were $217.68, itemized as follows:

June 30	Printing application blanks	$ 29.62
July 30	Stationery and postage	39.02
Aug. 18	Postage	11.96
Aug. 18	Stationery	13.00
Oct. 30	Die for badge	20.00
Nov. 30	Expenses to meeting National Council State Boards	85.49
Nov. 30	Stationery	8.25
Dec. 27	Postage and stationery	2.15
		$217.68

Balance on hand January 1, 1939 $108.85

The Budget for 1939 is as follows:

Membership in American Engineering Council	$100.00
Traveling expenses of representative to National Council State Boards and A.I.M.M.E.	175.00
Printing	75.00
Postage	50.00
Stenographic services	25.00
Contingent fund	25.00
	$450.00

The Executive Committee has voted a $2.00 assessment for 1939 and hopes that this may be reduced in 1940.

During the past year, your presiding officer represented the Institute at the annual meeting of the National Council of State Boards of Engineering Examiners in Des Moines, Iowa, and at the annual meeting of the American Institute of Mining and Metallurgical Engineers in New York.

Recommendations

The Institute should continue its intensive drive on the state boards for recognition and classification, especially in those states in which a considerable number of ceramic engineers are located.

The Institute should develop plans for the continued education and development of the young graduates. This is important in view of the growth of professional licensing. The examinations set up by state boards are continually becoming more difficult, and as a young engineer must have from four to eight years of experience before he can take them, he must study and review during that period if he expects to pass them. Other engineering societies are interesting themselves in this matter, and the Institute must do so if it is to live up to one of its stated objectives. The Committee on Professional Status and Development should be a strong one, composed of members who are interested in the development of the young graduates.

The Institute should continue to send representatives to the meetings of the National Council of State Boards of Engineering Examiners, the American Institute of Mining and Metallurgical Engineers, and to the American Engineering Council, and if finances permit, to other meetings of national engineering societies. The national societies are beginning to realize that there must be closer coöperation if the engineer is to obtain his "place in the sun."

Engineering is the only large profession which is broken up into many units, all working to the same ends but with little or no coördination. The inroads of the CIO among young engineers in some sections of the country is an evidence of the weakness of our present "set-up."

The Institute particularly needs these contacts because the members of other societies know little or nothing of ceramic engineers or their field. Even the mining engineers, from whom we sprung over forty years ago, were surprised to hear that the ceramic engineering field covered anything but art pottery and structural products; many of them, even among the educators, still have grave doubts about our claims to the refractories, glass, abrasives, enamels, and other fields. Our difficulty in convincing E.C.P.D. that we were not a specialized branch of chemical engineering should arouse us to the realization that we must "tell the world" what we include in the ceramic field in order to protect it for ourselves and to make it more secure for our graduates. It is surprising to find how many manufacturers of products that are definitely ceramic do not yet realize that our graduates can serve them better than any others.

Through our contact with the American Institute of Mining and Metallurgical Engineers, we not only secured a place for ceramic engineering in its booklet, but we were able to bring about the organization of the Mineral Technology Division in the Society for the Promotion of Engineering Education and to provide a place in that Division for the ceramic educators and the appointment of a Committee on Ceramic Engineering, of which the Institute's next President, Professor Carruthers, is chairman, while your present presiding officer is vice-chairman of the division. Your presiding officer has also been appointed Chairman of the Committee on Industrial Minerals of the Education Division of the A.I.M.M.E. as the representative of ceramic engineering. This is the first time ceramics has been represented officially in this organization.

You may be interested in a statement in a recent letter from one of the most prominent members of that organization. "We much appreciate your helpful association and coöperation in the work of the Education Division during the past several years, because for the first time to my knowledge, through you, we have been getting authentic information about ceramic engineering and its field."

It has been suggested that the Institute establish an employment bureau, particularly with the view to assist in placing our younger members. It is recommended that this matter be studied. No doubt it presents difficulties, but it is quite possible that for a time at least some faculty member in a department of ceramic engineering might be willing to handle the work.

Every department has calls, even in these times, for men who must meet certain specifications and for which no graduate is available. Some means can surely be found for clearing such calls through a central bureau. No one thing will tie young graduates to the Institute as will such an agency. It is worth a careful study.

In closing this Report, every member is urged to become active in the work of the Institute. The greater the number of active workers, the greater will be our accomplishments. It is not necessary to wait until you are asked to serve on a committee. Your new president will undoubtedly appreciate your volunteering for service.

—A. F. GREAVES-WALKER, *President*

REPORT OF THE SECRETARY

Founders: There were originally 156 members in the Founders Group, of whom Percy W. Burdick is now deceased and Frank C. Westendick has resigned. The names of the Founders appear on pages 128 and 129 of the March, 1938, issue of *The Bulletin*, except for J. E. Eagle who is also a Founder.

The total number is 154.

Membership: The other groups of membership are divided as follows:

	Member	Associate	Junior
1938	14	40	19
1939	7	15	8
	21	55	27
			1 (resigned)
			26
Total number			102
Total membership			256

These names have been published in *The Bulletin* from time to time.

Rejections: There were 15 rejections in 1938 and 3 in 1939.

Dues: On March 1, there were 23 members (4 member grade, 2 charter member grade, 12 associate grade, 5 junior grade) who were delinquent in their dues, *i.e.*, who had not paid their 1938 assessment. At that time there were three 1939 members who had not paid their assessment (2 junior grade and 1 member grade).

—C. M. DODD, *Secretary*

COMMITTEE ON PROFESSIONAL STATUS AND DEVELOPMENT REPORT

The duties of the Committee on Professional Status and Development as outlined in the Rules are as follows: "Its duty shall be to seek means of improving the professional status of ceramic engineers through publicity and contact with other organizations of engineers to develop means for encouraging a desirable type of high-school student to enter departments of ceramic engineering through the publication of articles, booklets, etc., and to develop a program of development for young ceramic engineering graduates."

The Committee has devoted its activities during the first year of its operation largely in an endeavor to learn what other engineering organizations have been doing. This is a report of its findings and suggestions of a future program for the Committee.

The study was confined largely to an investigation of the program for development of young ceramic engineering graduates. Information was obtained on what has been done along the line of professional guidance for high-school students interested in taking engineering courses. The work of improving the professional status of ceramic engineers through publicity and contacts with other organizations of engineers should come later.

In addition to investigating what is being done by other engineering organizations, a number of the larger companies in different industries employing engineers were questioned to determine whether they had any organized plan for training young engineering graduates by regular organized training courses, by regular meetings of the engineers, or by a recommended reading list of technical articles.

The most complete information was obtained from the E.C.P.D. Among the regular E.C.P.D. committees are three which devote their interest to problems of similar nature to those handled by this Committee, *viz.*, Committee on Professional Recognition, Committee on Professional Training, and Committee on Student Selection and Guidance. The report of each of these committees may be found in the Annual Report of E.C.P.D., October, 1938.

The objective of the Committee on Professional Training of the E.C.P.D. is to "stimulate those individual and collective activities which will develop the wisdom, knowledge, and skill of young engineers at the time they are entering and during the early stages of their chosen occupation."

Among the activities in connection with professional training being carried on by different engineering organizations and companies are the following:

(1) Local organizations of classes and discussion

groups have been established. The pioneering work in organizing an active group program for the development of junior engineers was started by the Providence, R. I., Engineering Society. This work is usually referred to as the "Providence Experiment." (For a description of this work see *Chem. Met. Eng.*, **44** [3] 128; or "18th Annual Industrial Conference," *Pa. State Coll. Tech. Bull.*, No. 25, p. 64.)

(2) Review of 1937–1938 technical publications listed in the 1938 Annual Report of the Committee on Professional Training, E.C.P.D.; (*a*) suggestions to Junior Engineers (published by E.C.P.D.). This includes a questionnaire to enable a junior engineer to make a personal appraisal of himself and a reading list for junior engineers with the general subject classification as follows: natural science; philosophy, including religion; economics and sociology; psychology; business and industrial management; literature, including poetry, essays, and fiction; history; biography and travel; fine arts; and general. (*b*) A selected Bibliography of Engineering Subjects (prepared by E.C.P.D.). "The bibliography represents a list of books mostly of college grade, with annotations to indicate the nature and depth of subject matter. It is published in five sections and will undergo revision from time to time to improve the present lists and to include notable future publications. The sections are I, mathematics, mechanics, and physics; II, aeronautical and civil engineering; III, chemical and industrial engineering; IV, electrical and mechanical engineering; and V, metallurgical and mining engineering.

(3) The Committee on Professional Training of E.C.P.D. in coöperation with the Pennsylvania State College arranged for the following papers at the Eighteenth Annual Industrial Conference: (*a*) "The Engineering Graduate in Industry and Professional Life," by R. E. Hellmund; (*b*) "The Providence Experiment," by Alton C. Chick; (*c*) "Educational Activities Sponsored by the Philadelphia Section, A.I.E.E., During the Recent Past," by H. S. Phelps; and (*d*) "Discussion," by A. D. Hinckley. These articles are available in "18th Annual Industrial Conference," *Pa. State Coll. Tech. Bull.*, No. 25.

(4) Additional technical reading lists are (*a*) Nontechnical Aspects of Engineering Education, a bibliography compiled by The Cooper Union Library, The Cooper Union for the Advancement of Science and Art, New York, N. Y.; (*b*) An Outline of Engineering Literature, compiled by Ellen R. Tilger, Librarian, Engineering Library, University of Nebraska, Lincoln, Neb.; and (*c*) Condensed Library of Engineering, by Charles E. Lucke, Stevens Professor of Mechanical Engineering, Columbia University.

(5) The replies from inquiries sent to a number of the large companies in different industries would indicate that few companies have made any attempt to promote the organization of local engineering groups. Some of the companies have regular training courses, including the General Electric Advanced Course, the Bell Telephone Laboratories "Out-of-Hour" Courses, Westinghouse Night School, General Motors Institute, and the Bethlehem Steel Company "Loop Course."

The principal efforts of the Committee on Student Selection and Guidance of E.C.P.D. have been "to emphasize the importance of precollege counsel to the prospective student, to the engineering college, to the engineering profession, and to society. Colleges have been urged to extend their influence and facilities for guidance to schools from which they draw students. The increased use of 'Engineering, a Career, a Culture' is evidence that there is an active sense of obligation and more effective procedure in helping youth to understand the abilities, opportunities, and responsibilities entailed in studying engineering."

Some of the activities in connection with the selection and guidance of prospective engineering students are as follows:

(1) A few engineering colleges have established experimental summer guidance camps to provide a combination of study, analysis, and discussion which should lead to better judgment by students, parents, and teachers than can be made without intimate, sympathetic, and able counsel.

(2) Numerous city engineering societies have inaugurated guidance programs in coöperation with their local high-school authorities. Some of the cities having active committees for engineering guidance programs are New York, Detroit, Denver, St. Louis, Kansas City, and Toronto. The following is a description of "The Detroit Plan," by S. D. Kirkpatrick, Secretary of the American Institute of Chemical Engineers:

"Officers of local sections and many members of the Institute are occasionally called upon to give advice to high-school students and other young men who wish to enter the chemical engineering profession. This is a responsibility that we can not and should not dodge if we are sincerely interested in the advance of our profession. Furthermore, it is a local rather than a national obligation, and for that reason the Committee on Professional Guidance believes that the members may be interested in a plan which has worked out quite effectively in Detroit.

"Last May, the Associated Technical Societies of Detroit, with the coöperation of the Detroit Board of Education, held their first annual guidance meeting for high-school students, at which more than 200 were present. The chairman of the meeting was L. A. Danse, chief metallurgist of the Cadillac Motor Car Co. and the representative in the Associated Technical Societies of Detroit of the American Institute of Chemical Engineers. He explained the purposes and plans of the meeting and introduced as the principal speaker, C. F. Hirshfeld, chief of research of the Detroit Edison Company and past-chairman of the E.C.P.D. Following Dr. Hirshfeld's address, which dealt with the opportunities and obligations of all the different branches of engineering, copies of the E.C.P.D. booklet, 'Engineering, a Career, a Culture,' were distributed to all the boys who attended.

"Then the general meeting adjourned to the separate conference rooms assigned to the various technical societies representing the different branches of the engineering profession. The procedure in the various conference rooms was for the chairman or one of his associates or both to address the students briefly in explanation of their division of engineering, and thereupon to answer questions from the interested students. A round-table discussion and personal interviews between counselors and individual students followed. It was felt by all who took part in the meeting that it was a great success, and the Plan is to be repeated each year.

"Meetings of this sort may readily be organized in communities of any size. Where there is a general engineering society or technical group, such as in Detroit, representing all of the different societies, it would be expected that the local section of A.I.Ch.E. would appoint a subcommittee on 'Student Selection and Guidance' to coöperate with similar committees from the other societies. That, in general, is the E.C.P.D. plan. On the other hand, where there is no joint engineering activity, A.I.Ch.E. members might well take the initiative in organizing meetings of the sort held in Detroit or merely offer their services directly to the high-school authorities who are certain to be interested in this kind of coöperation from the engineering profession.

"The A.I.Ch.E. Committee on Professional Guidance is primarily interested in organizing a program for the junior engineers, *i.e.*, those who have been out of college for five years or less. However, the chairman, A. E. Marshall, 401 Fifth Ave., New York, N. Y., or the secretary, S. D. Kirkpatrick, 330 West 42d St., New York, N. Y., will be pleased to learn of local programs of vocational guidance or any other advisory work with high-school students undertaken by members of the A.I.Ch.E."

(3) A number of publications are available for the guidance of prospective engineering students.

(*a*) A pamphlet, "Engineering; a Career, a Culture," distributed by E.C.P.D.

(*b*) "The Guidance Manual," prepared by the Committee on Selection and Guidance of E.C.P.D., which is

of aid to engineers and school officers who are helping to guide youth concerning engineering.

(*c*) Publications covering different divisions of engineering as a career, as well as other careers, are available through The Institute of Research, 537 South Dearborn St., Chicago, Ill. They have eighty-seven separate publications, including the general subject of selecting a career. One of the most recent of these publications is No. 81, "Ceramic Engineering as a Career."

(*d*) The Rensselaer Polytechnic Institute, Troy, N. Y., has published two bulletins, No. 55 on "Value of History in Engineering Education," by H. W. Dickinson, and No. 56 on "Amos Eaton as a Chemist," by H. S. Van Klooster, which should be inspirational and educational to junior engineers.

(*e*) "Vocational Guidance in Engineering Lines," edited by the American Association of Engineers. This is a 500-page book covering every phase of engineering, including ceramic engineering.

(*f*) The A.I.M.M.E. will publish a booklet entitled "Careers in the Mineral Industries," edited by T. T. Read of Columbia University. This booklet, to include information on the subject of ceramic engineering, should be available shortly.

Suggestions for Future Activities of Committee

Improving the Professional Status of Ceramic Engineers: (1) Endeavor to have the Institute of Ceramic Engineers recognized by and accepted as a participating body in the E.C.P.D. (2) Have a member on the following E.C.P.D. committees: Professional Recognition, Professional Training, and Student Selection and Guidance. (3) Prepare a selected bibliography to be included with or added to the present Selected Bibliography of the different sections on engineering subjects now published by E.C.P.D. (4) Prepare a booklet outlining the objectives of the Institute of Ceramic Engineers, its membership requirements, and the requirements for a professional engineer's license for distribution to ceramic engineers, graduate ceramic engineers, and to other engineering organizations.

Program for the Development of Young Ceramic Engineering Graduates: (1) Encourage young engineers to become familiar with the activities of E.C.P.D. (2) Encourage young engineers to contact local engineering or technical groups already in existence for the development of professional training. If not close enough for convenient travel to an existing local engineering or technical group and if enough engineers are not available locally to justify establishing a local engineering group, he should be encouraged to keep up with the literature and reading list which this Committee should recommend.

Development of a Means of Encouraging a Desirable Type of High-School Student to Enter the Department of Ceramic Engineering: (1) Should publish articles or sponsor the use of existing articles on the subject, which would be of use to local engineering or technical organizations and to high-school officials to assist a student in selecting an engineering career. (2) Should recommend that our members through their activities in local technical or engineering organizations or as individuals give special coöperation to the high-school officials by helping high-school students select an engineering career, paying particular attention to the type of young men to be encouraged to study ceramic engineering. —R. S. Bradley, *Chairman*

COMMITTEE ON CERAMIC ENGINEERING EDUCATION REPORT

According to the Rules of the Institute of Ceramic Engineers, the Committee on Ceramic Engineering Education shall consist of five members, of whom two shall be members of the faculties of departments of ceramic engineering to be appointed by the President to serve for terms of five years each. The Chairman of the Committee shall be appointed by the President to serve for a term of five years and shall be the Institute's representative on the Committee on Ceramic Education of The American Ceramic Society.

In accordance with this provision, President Greaves-Walker appointed the undersigned Committee subsequent to the organization of the Institute at the New Orleans Meeting, the Chairman being a member of the Committee on Education of The Society and representing the Institute on that Committee. The Chairman's term on The Society Committee had four years to run at the time of the appointment of the Institute Committee, and therefore his appointment as Chairman of the Institute Committee was for the same period of four years. This will insure that the term of office of the Chairman of the Institute Committee will coincide with his term as a member of The Society Committee, which is obviously the proper arrangement.

The Rules of the Institute stipulate that the duty of this Committee is to coöperate with departments of ceramic engineering and the Ceramic Educational Council in an effort to improve constantly the training of students in the departments of ceramic engineering so that they may meet the requirements of industry and of the State Boards of Engineering Examiners. The Committee felt that the first step in undertaking this responsibility would be to obtain the reactions of the industry as to the technical training and fitness for work of the recent ceramic engineering graduates. Accordingly, lists of graduates and their industrial connections for the last three years were obtained from the various ceramic schools, and a questionnaire was prepared by the Committee, consisting of ten questions covering the important points as to the training and ability of these graduates. Approximately 150 questionnaires were sent to each of the industries appearing on the lists.

Questionnaires were returned by 49 industries, 46 of whom furnished complete replies and information. This was approximately one-third of the total sent and it may be considered to be a fairly satisfactory response. It was particularly gratifying to note that the 46 industries that submitted replies were a representative list of the important ceramic industries, and all of the Divisions (except the Terra Cotta Division) of The American Ceramic Society were represented. Their replies therefore give a reliable cross section of the reactions of the industries to the question under consideration.

The individual questions and a brief summary of the replies to each follow herewith:

(1) Do you employ more than one ceramic engineer? The replies to question (1) indicated that 35 of the industries employed more than one ceramic engineer, and taking this into account, a total of 130 ceramic engineers were covered by the questionnaires returned.

(2) In employing ceramic graduates, what relative weight do you give the following: (*a*) scholastic record, (*b*) personality, and (*c*) extra-curricular activities? Question (2) revealed that (*a*) scholastic record and (*b*) personality are considered foremost with almost exactly equal consideration given to each; extra-curricular activities are considered of minor importance.

(3) In what type of work do you employ young ceramic graduates, *e.g.*, (*a*) production, (*b*) research, (*c*) testing, or (*d*) sales? Question (3) showed that the graduates are divided about equally among (*a*) production, (*b*) research, and (*c*) testing, and that these three activities account for approximately 85% of the total; this leaves but 15% engaged in sales work.

(4) (*a*) Have these men successfully fitted in your organization and (*b*) have they come up to your expectation? Approximately 80% of the answers to question (4) indicated that in most cases the graduates fitted successfully into the organizations. In stating whether they came up to expectations, however, there was considerable

difference of opinion; approximately 50% were not altogether satisfied, only 40% were willing to say that they had come up to all expectations, and the remaining 10% were definitely dissatisfied. This indicates a reasonable degree of satisfaction and probably as good as can be expected. The fact that 80% fitted successfully into the organizations and 40% came up to expectations without any reservations whatever is quite gratifying.

(5) If not successful, (*a*) has it been due to lack of academic training or (*b*) personal traits or (*c*) what are the principal faults? Question (5) brought forth the fact that the great majority of the criticism emphasized personal traits. Approximately 75% indicated that opinion; only 25% mentioned lack of academic training. In detailing the personal faults, lack of initiative and industriousness together with carelessness accounted for 40% of the replies; lack of coöperative spirit and not being able to get along with associates was indicated by 35%, and the remaining 25% showed a general lack of ability. The importance of personal traits and characteristics is definitely indicated in this analysis.

(6) Do you prefer that young ceramic engineers have taken specialized courses or that they have simply the fundamentals in ceramic technology and engineering? Replies to question (6) showed that a vast majority of the employers considered fundamentals in ceramic technology and engineering to be of first importance, 75% of them definitely stating this preference. Most of the remainder qualified their preference for specialized courses in one way or another; it was quite apparent, however, that this group realized the importance of fundamentals and probably showed preference for specialized courses on the basis that there would not be any sacrifice of well-grounded training in fundamentals.

(7) What ability do these men have to apply their knowledge of ceramic fundamentals and theory to plant practice? Question (7) revealed various degrees of satisfaction as to the ability to apply knowledge to plant practice, but a conservative summary shows that 70% may be considered as showing satisfactory ability in this respect and 30% do not.

(8) Of what relative importance do you consider the fundamental sciences, *viz.*, mathematics, physics, and chemistry? Question (8) brought forth the fact that in many cases all three are considered to be equal in importance, but where preference was shown, it appeared that chemistry was slightly favored, and physics and mathematics were given second and third choice. This preference, however, was not sufficiently shown to be important, and all three of these sciences, therefore, must be given an important place.

(9) How important do you consider the nonengineering subjects, *viz.*, (*a*) economics, (*b*) government, and (*c*) expression of ideas, oral and written?

The replies to question (9) were quite interesting. Expression of ideas, either oral or written, received almost a unanimous vote as to its importance. Approximately 20% indicated economics to be important, and only one reply gave government a place of importance; 40% stated that economics are not important, and 50% gave this opinion in regard to government. Approximately 40% felt that a knowledge of economics is desirable, and about the same percentage felt that way about government. The significant point about these replies is the reaction as to the expression of ideas. The fact that almost all of the replies indicated the importance of this must mean that there is room for improvement in the ability of our graduates to express themselves both in oral and written form.

(10) Do you care to make suggestions for the improvement of the present ceramic engineering training?

Question (10) brought forth a variety of suggestions for the improvement of present ceramic engineering courses—almost as many as replies received. A careful analysis of these suggestions, however, discloses that they may be condensed into a few major points which are summarized as follows:

(*a*) An increased emphasis upon the fundamental sciences and the fundamental consideration of ceramic subjects, including combustion and the effect of heat treatment on materials, is stressed more than any other single item.

(*b*) A certain amount of specialization should be provided in the last year of the course. Refractories, pyrometry, petrography, and furnace design are specifically mentioned for attention on this basis.

(*c*) There is considerable favor toward providing some work in nonceramic engineering subjects, particularly industrial organization, human relations, cost accounting, and business practice. Some additional attention to civil and electrical engineering is also mentioned.

(*d*) The English requirements should be increased with emphasis on Engineering English, both in written and oral form, such as reports and correspondence.

(*e*) The personal traits of students should receive more attention to develop greater initiative, better coöperative spirit, and ability to get along with associates. Weeding out of students should be guided in part by these considerations.

(*f*) Practical experience through summer work and frequent plant visitations are exceedingly important.

The foregoing data are presented for the consideration of the ceramic educators at the various ceramic schools. Much of these data may not be new, but it is hoped that they will develop some constructive ideas and suggestions in regard to the ceramic engineering courses.

The Committee wishes to emphasize three points in particular, which are especially commended to students and graduates, *viz.*, (1) Employers pay particular attention to personality in employing graduates because personal traits are a most important factor in the degree of success achieved by graduates; ability to get along with associates is vital; (2) a thorough grounding in the fundamentals is of utmost importance; and (3) ability in expression, both oral and written, is necessary.

The Committee will welcome any comments from the educators or anyone else on the data presented. It stands ready to coöperate in any way possible with the ceramic educators and the departments of ceramic engineering in their efforts to improve the caliber of our graduates.

As to a program of work for the coming year, the Committee contemplates submitting a questionnaire to Members of the Institute which, based upon their own experience will inquire what phases of their education have been most helpful and what phases have been of little or no importance and their opinion as to what should be included in present ceramic engineering courses.

Persons holding this grade of membership in general have had considerable experience in the industry and, as a class, have been relatively successful. Information of this kind and obtained from men of this caliber should be valuable and possibly should provide new ideas and thoughts beyond those obtained from the questionnaire submitted to the employers.

—E. H. Fritz, *Chairman;* R. M. Campbell, H. T. Coss, J. M. McKinley, and J. W. Whittemore

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REPORT OF FILM LIBRARY COMMITTEE OF THE SOCIETY

Visual Promotion of Ceramics

Previous lists of movie films pertaining to ceramics have been published (see *Bull. Amer. Ceram. Soc.*, **16** [5] 211–13; [9] 378; [11] 456 (1937)). It is desired to keep this list complete by publishing new films as they are produced and submitted for circulation. The following list, together with previous published lists, therefore represents an accurate compilation of available films on the subject. Most of the films may be borrowed by paying transportation charges and others are for sale only.

Arrangements for showing the films should be made directly with the sponsor listed with each film. The Society does not handle the films.

Note: The American Ceramic Society is in no way responsible for the accuracy of the information contained in these films.

—H. E. SIMPSON, *Chairman;* F. B. HOBART and R. C. PURDY, *Film Library Committee*

MOTION PICTURE FILMS AVAILABLE

Abrasives

(1) "Norton Abrasives" (1 reel), 16 mm.; sound on color. Story of manufacture of the grinding wheel from the mining of the raw material to its delivery to the carrier for transportation to the customer. Norton Co., Worcester, Mass.

(2) "Something New Under the Sun" (1 reel), 16 or 35 mm.; silent. Describes a new high-speed cutting material which ranks next to the diamond in hardness. General Electric Co., Schenectady, N. Y.

(3) "Jewels of Industry" (2 reels), 16 mm.; sound or silent. New film of creation and uses of modern abrasives and abrasive products. Y.M.C.A. Motion Picture Bureau, Chicago, Ill.

(4) "Molybdenum-Tungsten High-Speed Steels"; color film. Manufacture of high-speed steels. Ludlum Steel Co., Watervliet, N. Y.

Art and Archeology

(5) "Modes and Motors" (1 reel), 16 mm.; sound. Behind the scenes in Art and Color Section of General Motors. General Motors Corp., Detroit, Mich.

(6) "Potter's Wheel" (1 reel), 16 mm.; silent. American Museum of Natural History, New York, N. Y.

(7) "Indian Pottery Making" (2 reels), 16 mm.; silent. American Museum of Natural History, New York, N. Y.

(8) "ABC of Pottery Making," 16 mm. Bailey Film Service, 3405 University Ave., Los Angeles, Calif.

(9) "Ceramics" (2 reels), 16 mm.; silent. Study of art of pottery in the studio of Leon Volkmer. Harmon Foundation, Inc., 140 Nassau Street, New York, N. Y.

(10) "Pottery Making" (1 reel), 16 mm.; sound. Designing and making pottery as a school project. Edited Pictures System, Inc., 330 W. 42nd St., New York, N. Y.

(11) "Pottery Making" (1 reel), 16 mm.; sound. Pinkney Film Service Co., Pittsburgh, Pa.

(12) "Ceramics" (2 reels), 16 mm.; silent. Y.M.C.A. Motion Picture Bureau, Chicago, Ill.

Cements

(13) "From Mountain to Cement Sack" (1 reel), 16 or 35 mm.; silent. Made in coöperation with Universal Atlas Cement Co.; U. S. Bureau of Mines, Pittsburgh, Pa.

Chemistry and Physics

(14) "A Modern Zeus" (1 reel), 16 or 35 mm.; sound. Destructive effect of natural lightning is depicted and devices shown to protect electric power systems. General Electric Co., Schenectady, N. Y.

(15) "Heat and Its Control" (4 reels), 16 mm.; sound. Actual laboratory demonstrations, animated drawings, and shadowgraphs used in this talking motion picture to give an actual visualization of story of heat. Of interest to those interested in conservation of heat. Johns-Manville, New York, N. Y.

(16) "Hottest Flame in the World" (4 reels), 35 mm.; sound. Experiments with vacuum tubes and hydrogen in perfecting the atomic-hydrogen welding process, which produces the hottest flame in the world. General Electric Co., Schenectady, N. Y.

(17) "Constitutions and Transformations of the Elements" (2 reels), 35 mm.; sound. Experiments of Sir Ernest Rutherford. General Electric Co., Schenectady, N. Y.

(18) Westinghouse News Reel (1 reel), 35 mm.; sound. Novel accomplishments in science. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

(19) "Wonder World of Chemistry" (2 reels), 16 or 35 mm.; sound. Fast-moving presentation of chemical research and manufacturing and their contribution to the present age. Depicts story of chemical industry and how that industry is creating "better things for better living through chemistry." R. & H. Chemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

(20) "Surface Changes in Metals at High Temperatures" (1 reel), 16 or 35 mm.; silent. Harvard Film Service, Harvard University, Cambridge, Mass.

Enamel

(21) "Three Women" (5 reels), 35 mm.; sound. Depicting all-electric kitchen; part of picture in technicolor. General Electric Co., Schenectady, N. Y.

(22) "They Know How" (2 reels), 16 or 35 mm.; sound. Trip through G. E. refrigerator factories showing intimate details in manufacture of quality vacuum-sealed refrigerator. General Electric Co., Nela Park, Cleveland, Ohio.

(23) "Romance of Iron and Steel," 16 or 35 mm.; sound. Manufacture of Armco Enameling Iron. American Rolling Mill Co., Middletown, Ohio.

(24) "New Continuous Process of Making Iron and Steel Sheets," 16 or 35 mm.; silent. American Rolling Mill Co., Middletown, Ohio.

General

(25) "Progress on Parade" (1 reel), 16 or 35 mm.; sound. Portrayal of how men, methods, and materials are brought together in making General Motors products; sequences show research, styling, testing and manufacturing operations. Narrated by Lowell Thomas and Edwin C. Hill. General Motors Corp., Detroit, Mich.

(26) "Frontiers of the Future" (1 reel), 16 mm.; sound. How research is bringing within reach new products and new ways of using old materials. General Motors Corp., Detroit, Mich.

(27) "Harvest of Years" (3 reels), 16 or 35 mm.; sound. Story behind manufacture of motor cars showing Ford research and methods; unusually entertaining. Available through Ford dealers.

(28) "Why We Do It the Way We Do" (4 reels), 16 or 35 mm.; sound. Development of new insulation methods and materials for electric motors. General Electric Co., Schenectady, N. Y.

(29) "From Now On" (3 reels), 16 or 35 mm.; sound. Featuring all-electric home. General Electric Co., Nela Park, Cleveland, Ohio.

(30) "Wildwood, a 100-Percent Mechanized Mine" (3 reels), 16 or 35 mm.; silent. Made in coöperation with Westinghouse Electric & Mfg. Co., U. S. Bureau of Mines, Pittsburgh, Pa.

(31) "From Clay to Bronze" (3 reels), 16 or 35 mm.; silent. Harvard Film Service, Harvard University, Cambridge, Mass.

(32) "Twelve Points of Safety" (1 reel), 35 mm.; silent. Made in coöperation with Peabody Coal Co.; stresses important safety measures in mining. U. S. Bureau of Mines, Pittsburgh, Pa.

(33) "Story of Lubricating Oil" (2 reels), 16 or 35 mm.; silent. Made in coöperation with Standard Oil Co. (Indiana); shows importance of lubrication to machinery. U. S. Bureau of Mines, Pittsburgh, Pa.

(34) "Research Paves the Way" (1 reel), 16 mm.; silent. Modern approach through organized chemical, physical, and mechanical research to development of new useful alloys and establishment of their use in industry. Y.M.C.A. Motion Picture Bureau, Chicago, Ill.

(35) "Deutsches Museum in Munich" (1 reel), 16 mm.; sound. Various scientific wonders on exhibition at the greatest museum of science in the world. Ideal Pictures Corp., 28 East 8th St., Chicago, Ill.

(36) "Excursions in Science" (1 reel), 16 or 35 mm.; sound. Interesting inventions and developments which, when perfected, may have an important effect on the future of the world. General Electric Co., Schenectady, N. Y.

Geology

(37) "Sand and Clay" (1 reel), 16 mm.; silent. Gives understanding of rock–soil cycle in nature and of commercial significance of minerals involved; sand, glass, and clay are considered. Eastman Kodak Co., Rochester, N. Y.

(38) "Wearing Away of the Sand" (1 reel), 16 or 35 mm.; sound. Harvard Film Service, Harvard University, Cambridge, Mass.

Glass

(39) "Romance of Glass" (5 reels), 16 mm.; silent. Manufacture of plate glass, mirrors, bent glass, tempered plate glass, safety glass, window glass, and glass blocks. Pittsburgh Plate Glass Co., Pittsburgh, Pa.

(40) "Excursions in Science" (1 reel), 16 or 35 mm.; sound. Manufacture of electric lamps from raw material to finished product. General Electric Co., Schenectady, N. Y.

(41) "Light of a Race" (1 reel), 16 or 35 mm.; silent. Historical account of artificial illumination. General Electric Co., Schenectady, N. Y.

(42) "Light for Sight" (2 reels), 16 mm.; sound. Discussion on advantages and needs for better lighting in homes. General Electric Co., Schenectady, N. Y.

(43) "Making Safety Glass" (2 reels), 16 or 35 mm.; sound. Interesting portrayal of development of safety glass, showing complete steps in the manufacture. Available through Ford dealers.

(44) "From Desert Sand to Sparkling Glass Creations" (1 reel), 16 mm.; silent. Manufacture of glass jars. Charles High Films, 1213 Boulder Avenue, Tulsa, Okla.

(45) "From Desert to Doorstep" (2 reels), 16 mm.; silent. Manufacture of milk bottles, Charles High Films, 1213 Boulder Ave., Tulsa, Okla.

(46) "Glass Making" (1 reel), 16 mm.; silent. Entire process of making crystal glassware. Henry Sazin Co., 155 E. Moshoalu Parkway, New York, N. Y.

(47) "Eyes of Science" (3 reels), 16 mm.; silent. Manufacture of optical glass, lens grinding, application of optical instruments, etc. Y.M.C.A. Motion Picture Bureau, Chicago, Ill.

(48) "New Romance of Glass" (2 reels), 16 or 35 mm.; sound or silent. Opens with Phoenicians' accidental discovery of making glass; concludes with up-to-date canning demonstration. Made in coöperation with Ball Brothers Co.; Y.M.C.A. Motion Picture Bureau, Chicago, Ill.

Kilns, Furnaces, Fuels, and Combustion

(49) "Bessemer Process" (2 reels), 16 mm.; color. Manufacture of steel by Bessemer process. Jones & Laughlin Steel Corp., Pittsburgh, Pa.

(50) "Steel Making in 1500-Pound Experimental Open Hearth" (2 reels), 16 mm.; color. Jones & Laughlin Steel Corp., Pittsburgh, Pa.

(51) "Story of Steel Mining, and Making of Pig Iron and Steel Ingots" (2 reels), 16 or 35 mm.; silent. Made in coöperation with United States Steel Corp.; U. S. Bureau of Mines, Pittsburgh, Pa.

(52) "Story of Steel Manufacture of Steel Sheet and Tin Plate" (1 reel), 16 or 35 mm.; silent. Made in cooperation with United States Steel Corp.; U. S. Bureau of Mines, Pittsburgh, Pa.

Refractories

(53) "Steel—Man's Servant" (4 reels), 35 mm. Manufacturing steel from ore mines to finished product. Technicolor sound film with narration by Edwin C. Hill and music by Robert Armbruster's Orchestra. United States Steel Corp., 436 Seventh Ave., Pittsburgh, Pa.

(54) "Under Fire," 16 mm.; sound. Manufacture of Champion spark plug from time sillimanite is mined to assembly of spark plug. Champion Spark Plug Co., Toledo, Ohio.

(55) "Story of a Spark Plug" (revised) (2 reels), 16 or 35 mm.; silent. Made in coöperation with Champion Spark Plug Co.; U. S. Bureau of Mines, Pittsburgh, Pa.

(56) "Story of Asbestos" (2 reels), 16 or 35 mm.; silent. Made in coöperation with the Johns-Manville Corp.; U. S. Bureau of Mines, Pittsburgh, Pa.

(57) "The Molder" (1 reel), 16 or 35 mm.; silent. Mass production of small gray-iron casting by means of modern conveying and pouring system. General Electric Co., Schenectady, N. Y.

Structural Clay Products

(58) "House that Ann Built" (6 reels), 16 mm.; sound. Fascinating ideas about new homes and home remodeling. Johns-Manville feature. Y.M.C.A. Motion Picture Bureau, New York, N. Y.

(59) "International Power in Industry" (1 reel), 16 or 35 mm.; sound-on-film. Interesting scenes of tractors and power units serving industry by performing many operations. International Harvester Co., Chicago, Ill.

(60) "Pay Dirt" (1 reel), 16 or 35 mm.; sound-on-film. Removal of overburden and strip mining. International Harvester Co., Chicago, Ill.

(61) "Adobe Brick Making," 16 mm. Bailey Film Service, 3405 University Ave., Los Angeles, Calif.

(62) "Face Brick" (1 reel), 16 mm.; silent. Pinkney Film Service Co., Pittsburgh, Pa.

Whiteware

(63) "Kilowatt Trail" (1 reel), 16 or 35 mm; sound. Series of short manufacturing user and consumer scenes showing trail of kilowatt. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

(64) "New Frontiers" (2 reels), 16 or 35 mm.; sound. Portrayal of progress and achievements, past and present, with predictions for the future of Westinghouse in all activities where electricity serves mankind. Professionally produced with running comment and background music. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

(65) "Earth to Industry" (2 reels), 16 mm.; color. Manufacture of chemical stoneware. General Ceramics Co., 30 Rockefeller Plaza, New York, N. Y.

(66) "Look Before You Eat," sound film. Views of ware manufactured in American potteries. United States Potters Assn., East Liverpool, Ohio.

(67) "Pottery" (1 reel), 35 mm.; silent. Material in modern pottery clay; grinding and mixing clays; other processes; forming, decorating, firing, etc. Visual Instruction Service, Iowa State College, Ames, Iowa.

(68) "Making Pottery" (revised) (1 reel), 16 mm.; silent. Georgia School of Technology, Atlanta, Ga.

(69) "Making China" (1 reel), 16 mm.; silent. Entire process of making English bone china. Henry Sazin Co., 155 East Mosholu Parkway, New York, N. Y.

(70) "Romance of Pottery" (2 reels), 16 mm.; sound and color. Produced for Gladding, McBean, & Co., Los Angeles, Calif.; distributed by Allied Film Exhibitors, 719 South Flower St., Los Angeles, Calif.

(71) "Porcelain Industry in Czechoslovakia" (1 reel),

16 or 35 mm.; silent. Pinkney Film Service Co., Pittsburgh, Pa.

(72) "Miller's System Automatic Production, Forming, and Drying of Dinnerware," 16 mm.; silent. Miller Pottery Engineering Co., Swissvale, Pa.

(73) "Porcelain Museum" (1 reel), 16 mm.; sound. Rare international collection of porcelains in Moscow Museum. Amkino Corp., 723 Seventh Ave., New York, N. Y.

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E. H. FRITZ: Westinghouse Electric & Mfg. Co., Derry, Pa.
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R. C. PURDY: 2525 North High St., Columbus, Ohio

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L. H. MILLIGAN: Norton Company, Worcester, Mass.
L. M. MERRITT: Insulations Inc., Columbus, Ohio

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LOCAL SECTION NEWS

CENTRAL OHIO SECTION

A meeting of the Central Ohio Section was held in the Battelle Memorial Institute auditorium, June 2, 1939. A. S. Watts, Department of Ceramic Engineering, Ohio State University, spoke on "Ceramic Dinnerware." The talk was accompanied by an interesting display of domestic and foreign ware.

—WALTER C. RUECKEL, *Chairman*

BALTIMORE-WASHINGTON SECTION

The spring meeting of the Baltimore-Washington Section was held at the Arts Club in Washington, D. C., May 13, 1939.

Miss Christine Alexander, Associate Curator of Greek and Roman Art, Metropolitan Museum of Art, New York, spoke on "Ancient Roman Glass." Many photographic slides of original pieces were shown to illustrate the evolution of this ancient craft. Miss Alexander has spent several years in Egypt and Europe and is familiar with the most famous collections of ancient glass.

The following officers were elected for 1939–1940:

Chairman: J. D. TETRICK, Baltimore Enamel & Novelty Co., Baltimore, Md.
Vice-Chairman: DONALD HUBBARD, National Bureau of Standards, Washington, D. C.
Secretary-Treasurer: KENNETH M. SMITH, Severn Clay Co., Baltimore, Md.
Councillor: G. R. SHELTON, National Bureau of Standards, Washington, D. C.

—DONALD HUBBARD, *Secretary-Treasurer*

ST. LOUIS SECTION

The spring meeting of the St. Louis Section of The American Ceramic Society met on March 30, 1939, at Garavelli's Restaurant in St. Louis, Mo. Forty-four persons were present.

After dinner, H. M. Tostlebe, *Chairman,* opened the meeting. The minutes of the last meeting and the Treasurer's Report were read and accepted.

The following program was presented:

(1) "Materials," motion picture by courtesy of General Motors Corp.

(2) "The Wagner Turbidimeter as a Means of Measuring Grain-Size Distribution of Ceramic Materials," by L. A. WAGNER, Missouri Portland Cement Co., St. Louis, Mo.

(3) "Thermal Dissociation of Diaspore Clay," by PAUL G. HEROLD, School of Mines and Metallurgy, Rolla, Mo.

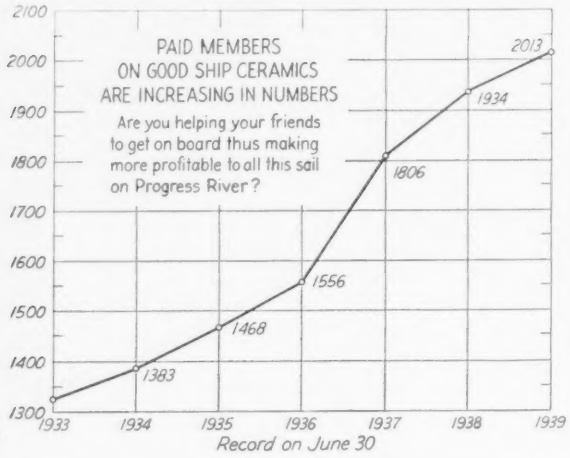
(4) "Reactions Between Solids in the System CaO–MgO–SiO_2 in Temperature Range 600° to 1200°C," by F. J. WILLIAMS, National Lead Co., St. Louis, Mo.

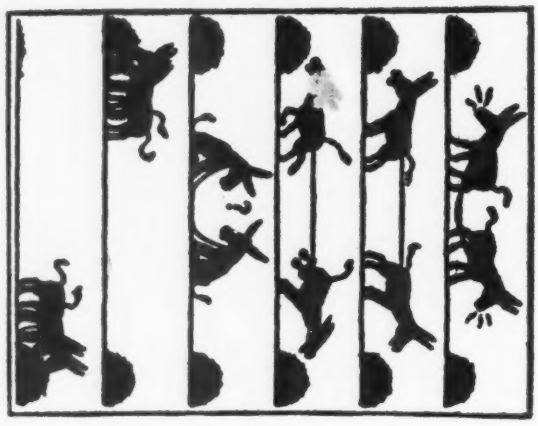
—PAUL G. HEROLD, *Secretary*

EXHIBIT OF ART ENAMELS

An exhibit of antique porcelain enamels owned by R. A. Weaver of the Ferro Enamel Corporation is on display during the summer months at the Dayton Art Institute, Dayton, Ohio.

TOGETHER WE PULL TO WIN ON PROGRESS RIVER





NEW MEMBERS, MAY 30 TO JUNE 16

Corporation

STAUFFER CHEMICAL COMPANY, INC., New York, N. Y.
WASHINGTON PORCELAIN COMPANY, Washington, N. J.

Personal

BIDDULPH, ALBERT, Wolverhampton, England
BOSAZZA, V. L., Johannesburg, South Africa
HUNTER, CHARLES E., Norris, Tenn.
JANSMA, FRANK, Washington, Pa.
RUGH, KENNETH A., Bolivar, Pa.
SMITH, FRANK A., Berkeley, Calif.

Student

BRUNINGA, ERVIN B., Macomb, Ill.
CORDES, JOHN E., Rockford, Ill.
FAHRENBRUCK, W. O., Tiffin, Ohio
HANKS, CHARLES F., Champaign, Ill.
MCCANN, ROBERT J., DeKalb, Ill.
PALMER, GUS, JR., Raleigh, N. C.
STUCKEY, ROBERT C., Raleigh, N. C.
WALTER, MARY FRANCES, Tulsa, Okla.
ZINK, GEORGE H., Urbana, Ill.

MEMBERSHIP WORKERS' RECORD

Corporation			
Karl Türk	1	R. B. Sosman	1
Personal			
A. I. Andrews	6	R. B. Sosman	1
G. H. Brown	1	Office	2
Student			
A. I. Andrews	7	Hillard A. Smith	1
A. F. Greaves-Walker	1	Office	1
		Grand Total	**22**

PAID MEMBERS AND SUBSCRIPTIONS TO JUNE 16

Personal	1739	
Corporations	232	
Installment pay	42	2013
Subscribers	611	
Monthly sales	200	831
		2844

1939 FINANCIAL STATEMENT ON MAY 31

INCOME		
Earned dues	$10,607.19	(5/12 of total)
Subscriptions and sales	2,621.50	(5/12 of total)
Other sources	6,495.03	
Total earned	$19,723.72	
EXPENSES		
Printing and editorial	$13,496.11	74.75%
General operating expenses	4,557.68	
Total expended	$18,053.79	
UNEXPENDED	$ 1,669.93	8.4%

ASSETS	
Cash	$14,144.29
Invested reserve	9,458.16
Accounts receivable	2,293.96
Advance Meeting payment	31.64
	$25,928.05

Furniture, stock, exhibits, photo gallery, and unpaid dues are not listed as assets

LIABILITIES	
Payable to ear-marked projects	$ 2631.11
7/12 of dues and subscriptions not yet earned	17,988.19
Total liabilities and unearned income	$20,619.30
SURPLUS	5,308.75
TOTAL	$25,928.05

ROSTER OF CORPORATION MEMBERS

Abbé Engineering Co., New York, N. Y.
Abingdon Sanitary Mfg. Co., Abingdon, Ill.
A C Spark Plug Co., Flint, Mich.
Akron Porcelain Co., Akron, Ohio
American Gas Assn., New York, N. Y.
American Lava Corp., Chattanooga, Tenn.
American Nepheline Corp., Rochester, N. Y.
American Potash & Chemical Corp., New York, N. Y.
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American Rolling Mill Co., Middletown, Ohio
American Stove Company, St. Louis, Mo.
Amsler-Morton Co., Pittsburgh, Pa.
Anchor Hocking Glass Corp., Lancaster, Ohio
Arketex Ceramic Corp., Brazil, Ind.
Atlantic Terra Cotta Co., Perth Amboy, N. J.

Babcock & Wilcox Co., New York, N. Y.
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Baltimore Enamel & Novelty Co., Baltimore, Md.
Bausch & Lomb Optical Co., Rochester, N. Y.
Binghamton Brick Co., Inc., Binghamton, N. Y.
Blue Ridge Glass Corp., Kingsport, Tenn.
Blythe Colour Works, Ltd., Cresswell, Stoke-on-Trent, England
Bonnot Company, Canton, Ohio
Braun Corp., Los Angeles, Calif.
Brockway Glass Company, Inc., Brockway, Pa.
Buck Glass Company, Baltimore, Md.
Buffalo Pottery, Buffalo, N. Y.

Canadian General Electric Co., Ltd., Peterborough, Ontario, Canada
Canton Stamping & Enameling Co., Canton, Ohio
Carborundum Company, Niagara Falls, N. Y.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Celo Mines, Inc., Burnsville, N. C.
Central Silica Company, Zanesville, Ohio
Ceramic Color & Chemical Mfg. Co., New Brighton, Pa.
Certain-Teed Products Corp., Buffalo, N. Y.
Champion Spark Plug Co., Detroit, Mich.
Chattanooga Glass Co., Chattanooga, Tenn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Chicago Pottery Co., Chicago, Ill.
Chicago Vitreous Enamel Product Co., Cicero, Ill.
Clark, N., & Sons, San Francisco, Calif.
Commercial Decal Products, Inc., East Liverpool, Ohio
Coors Porcelain Company, Golden, Colo.
Corhart Refractories Co., Inc., Louisville, Ky.
Corning Glass Works, Corning, N. Y.
Crane Enamelware Company, Chattanooga, Tenn.
Cronin China Co., Minerva, Ohio
Crooksville China Co., Crooksville, Ohio
Crossley Machine Co., Trenton, N. J.
Crossman Company, South Amboy, N. J.
Crown Potteries Co., Evansville, Ind.

DeVilbiss Co., Toledo, Ohio
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Drakenfeld, B. F., & Co., New York, N. Y.
Du Pont de Nemours, E. I., & Co., R. & H. Chemicals Dept., Wilmington, Del.

Edgar Plastic Kaolin Co., Metuchen, N. J.
Electro Refractories & Alloys Corp., Buffalo, N. Y.
Engelhard, Charles, Inc., Newark, N. J.
Engineering & Construction Div., Koppers Company, Pittsburgh, Pa.
English China Clays Sales Corp., New York, N. Y.
Eureka Flint & Spar Co., Trenton, N. J.
Exolon Company, Blasdell, N. Y.

Fairfacts Company, Inc., Trenton, N. J.
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Fords Porcelain Works, Perth Amboy, N. J.
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Glenwood Range Co., Taunton, Mass.
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Great Lakes Steel Corp., Detroit, Mich.
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Hall China Company, East Liverpool, Ohio
Hancock Brick & Tile Co., Findlay, Ohio
Hanley Company, Summerville, Pa.
Hanovia Chemical & Mfg. Co., Newark, N. J.
Hardinge Company, Inc., York, Pa.
Harshaw Chemical Co., Cleveland, Ohio
Hartford-Empire Co., Hartford, Conn.
Haws Refractories Company, Johnstown, Pa.
Hazel-Atlas Glass Co., Washington, Pa.
Hommel, O., Co., Pittsburgh, Pa.
Houze, L. J., Convex Glass Co., Point Marion, Pa.
Hygrade Sylvania Corp., Emporium, Pa.

Idaho Fire Brick & Clay Co., Troy, Idaho
Illinois Clay Products Co., Joliet, Ill.
Ingram-Richardson Mfg. Company of Indiana, Inc., Frankfort, Ind.
International Smelting & Refining Co., Akron, Ohio
Irish Glass Bottle Co., Ltd., Dublin, Ireland
Isolantite, Incorporated, Belleville, N. J.

Kaolin, Incorporated, Spruce Pine, N. C.
Kentucky Clay Mining Co., Mayfield, Ky.
Kentucky-Tennessee Clay Co., Mayfield, Ky.
Knowles, Edwin M., China Co., Newell, W. Va.
Kohler Company, Kohler, Wis.
Kraftile Company, Niles, Calif.

Laclede-Christy Clay Products Co., St. Louis, Mo.
Lancaster Iron Works, Lancaster, Pa.
Lapp Insulator Co., Inc., Le Roy, N. Y.
Laughlin, Homer, China Co., Newell, W. Va.
Lava Crucible Co. of Pittsburgh, Pittsburgh, Pa.
Lee Clay Products Company, Clearfield, Ky.
Libbey Glass Company, Toledo, Ohio
Libbey-Owens-Ford Glass Co., Toledo, Ohio
Limoges-Salem China Co., Sebring, Ohio
Lindemann, A. J., & Hoverson Co., Milwaukee, Wis.
Locke Insulator Corp., Baltimore, Md.
London Brick Co., Ltd., London, England
Louthan Manufacturing Co., East Liverpool, Ohio
Lynch Corporation, Anderson, Ind.
Lynch, A. J., & Co., Los Angeles, Calif.

Maryland Glass Corp., Baltimore, Md.
Mason City Brick & Tile Co., Mason City, Iowa
Maxson, Elwyn L., Los Angeles, Calif.
McHose, L. H., Inc., Perth Amboy, N. J.
McKee, Arthur G., & Co., Cleveland, Ohio
Metal & Thermit Corp., New York, N. Y.
Metro Glass Bottle Co., Jersey City, N. J.

Mississippi Glass Co., New York, N. Y.
Mitchell Clay Mfg. Co., St. Louis, Mo.
Moore Enameling & Mfg. Co., West Lafayette, Ohio
Moore & Munger, New York, N. Y.
Mosaic Tile Company, Zanesville, Ohio
Mount Clemens Pottery Co., Mount Clemens, Mich.

National Engineering Co., Chicago, Ill.
National Fireproofing Corp., Pittsburgh, Pa.
National Gypsum Co., Buffalo, N. Y.
National Industrial Sand Assn., Washington, D. C.
National Lead Co., Brooklyn, N. Y.
National Lime and Stone Co., Findlay, Ohio
Newbold Silica Fire-Brick Co., Ltd., Sydney, N.S.W., Australia
New Castle Refractories Co., New Castle, Pa.
New Jersey Porcelain Co., Trenton, N. J.
New Jersey Pulverizing Co., New York, N. Y.
Nippon Gaishi Kabushiki Kaisha, Nagoya, Japan
Nippon Toki Kaisha, Ltd., Nagoya, Japan
North American Refractories Co., Cleveland, Ohio
North Carolina Feldspar Corp., Erwin, Tenn,
Norton Company, Worcester, Mass.

Ohio Insulator Company Div., Ohio Brass Co., Barberton, Ohio
Old Hickory Clay Co., Paducah, Ky.
Olean Tile Co., Olean, N. Y.
Onondaga Pottery Co., Syracuse, N. Y.
Orton, Edward, Jr., Ceramic Foundation, Columbus, Ohio
Owens-Illinois Glass Co., Alton, Ill.
Owens-Illinois Pacific Coast Co., San Francisco, Calif.

Pacific Clay Products, Los Angeles, Calif.
Pacific Tile & Porcelain Co., Los Angeles, Calif.
Paper Makers Importing Co., Inc., Easton, Pa.
Pass & Seymour, Inc., Solvay, N. Y.
Pennsylvania Pulverizing Co., Lewistown, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Pfaudler Company, Rochester, N. Y.
Pittsburgh Plate Glass Co., Creighton, Pa.
Porcelain Enamel & Mfg. Co., Baltimore, Md.
Portsmouth Clay Products Co., Portsmouth, Ohio
Potters Supply Co., East Liverpool, Ohio
Precision Grinding Wheel Co., Philadelphia, Pa.

Quigley Company, Inc., New York, N. Y.

Ransome Concrete Machinery Co., Dunellen, N. J.
Ramtite Co., Chicago, Ill.
Republic Steel Corp., Youngstown, Ohio
Rickmann & Rappe, Köln-Kalk, Germany
Riddell, W. A., Co., Bucyrus, Ohio
Roseville Pottery Co., Zanesville, Ohio
Ross-Tacony Crucible Co., Philadelphia, Pa.
Rundle Manufacturing Co., Milwaukee, Wis.
Rustless Iron Co., Ltd., Keighley, England

Safety Grinding Wheel & Machine Co., Springfield, Ohio
Salem China Company, Salem, Ohio
San Miguel Brewery, Inc., Manila, P. I.
Shenango Pottery Company, New Castle, Pa.
Simonds Worden White Co., Dayton, Ohio
Smith & Stone, Ltd., Georgetown, Ontario, Canada
Solvay Process Company, Syracuse, N. Y.
Southern California Gas Co., Los Angeles, Calif.
Spinks, H. C., Clay Co., Newport, Ky.
Square D Company, Detroit, Mich.
Standard Lime & Stone Co., Baltimore, Md.
Standard Sanitary Mfg. Co., Louisville, Ky.
Star Porcelain Co., Trenton, N. J.
Stark Brick Co., Canton, Ohio
Stauffer Chemical Co., Inc., New York, N. Y.
Steele, J. C., & Sons, Statesville, N. C.
Sterling Grinding Wheel Co., Tiffin, Ohio
Structural Clay Products, Inc., Washington, D. C.
Summitville Face Brick Co., Summitville, Ohio
Sur Enamel & Stamping Works, Ltd., Calcutta, India
Swindell Brothers, Baltimore, Md.
Swindell-Dressler Corp., Pittsburgh, Pa.

Taylor, Smith, & Taylor Co., Chester, W. Va.
Texas Mining & Smelting Co., Laredo, Texas
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
Toyo Toki Kwaisha, Kokura City, Japan
Trenton Potteries, Trenton, N. J.
Twyfords, Limited, Stoke-on-Trent, England
Tyler, W. S., Company, Cleveland, Ohio

Union Electrical Porcelain Works, Inc., Trenton, N. J.
Union Française des Produits Refractaires, Paris, France
United Clay Mines Corp., Trenton, N. J.
United Glass Bottle Mfrs., Ltd., London, England
United States Gypsum Co., Chicago, Ill.
Universal Clay Products Co., Sandusky, Ohio
Universal Dental Co., Philadelphia, Pa.
Universal Sanitary Mfg. Co., New Castle, Pa.

Vereeniging Brick & Tile Co., Ltd., Vereeniging, Transvaal, South Africa
Verreries Souchon Neuvesel, Lyon, France
Vesuvius Crucible Co., Swissvale, Pa.
Victor Insulators, Inc., Victor, N. Y.
Vitrefrax Corporation, Los Angeles, Calif.
Vitreous Steel Products Co., Cleveland, Ohio
Vitro Manufacturing Co., Pittsburgh, Pa.

Wallace China Co., Ltd., Huntington Park, Calif.
Waltham Grinding Wheel Co., Waltham, Mass.
Washington Porcelain Co., Washington, N. J.
Wayne Laboratories, Waynesboro, Pa.
Western Brick Co., Danville, Ill.
Western Electric Co., Chicago, Ill.
Westinghouse Electric & Mfg. Co., Derry, Pa.
West Virginia Brick Co., Charleston, W. Va.
Wheeling Steel Corp., Yorkville, Ohio
Whitall-Tatum Co., Millville, N. J.

Youngstown Arc Engraving Co., Youngstown, Ohio

WHY CORPORATION MEMBERSHIPS

- The American Ceramic Society is America's only organization exclusively devoted to promoting ceramic arts, science, and technology.
- This Society is a nonprofit corporation expending its entire income on
  (*a*) promoting and publishing original researches
  (*b*) abstracting world-wide ceramic literature
  (*c*) promoting ceramic research in federal and state surveys, bureaus, institutes, and universities.
- Audited financial statements show 74.75% of The Society's income is expended on publications.
- The dues from personal members are not adequate to conduct the many activities in which this Society should be engaged and to publish all of the available research reports.
- Ceramic corporations have profited from the activities of The American Ceramic Society. They would profit more if each corporation invested the minimum of $25.00 annually with The Society.

NEW MEMBERS*

Corporation

STAUFFER CHEMICAL CO., INC., 420 Lexington Ave., New York, N. Y.

*WASHINGTON PORCELAIN CO., Elmer E. Miller (voter), Willow Street, Washington, N. J.

Personal

ANDERSON, WILLIAM H. L., Forsyth Place, East Liverpool, Ohio; vice-president, Edwin M. Knowles China Co.

*BIDDULPH, ALBERT, 11, Holden Road, Penn, Wolverhampton, England; metallurgical ceramist, Ferro Enamels, Ltd.

BOSAZZA, V. L., 39 Barkley Rd., Parktown, Johannesburg, South Africa; minerals research officer, University of the Witwatersrand.

GILES, ROY T., 1400 Chrysler Bldg., New York, N. Y.; service director, Atlas Lumnite Cement Co.

HUNTER, CHARLES E., Box 393, Norris, Tenn.; assistant geologist, Tennessee Valley Authority.

JANSMA, FRANK, Box 519, Washington, Pa.; manager, Clayware Colors Div., B. F. Drakenfeld & Co., Inc.

LEAVY, JOHN C., 233 Roslyn Ave., Glenside, Pa.; chief ceramist, Conkling-Armstrong Terra Cotta Co.

MEYER, HENRY E., 420 Hillcrest Dr., Wyoming, Ohio; vice-president, Cambridge Tile Mfg. Co.

MILLER, JOHN W., New Castle Refractories Co., New Castle, Pa.; treasurer.

RUGH, KENNETH A., Garfield Refractories Co., Bolivar, Pa.; president.

SMITH, FRANK A., R.F.D. Route 1, Box 481, Berkeley, Calif.; owner, "The Potters Wheel" Ceramic Studio.

Student

University of Illinois: ERVIN B. BRUNINGA, JOHN E. CORDES, ROBERT J. MCCANN, AND GEORGE H. ZINK.

New York State College of Ceramics: BERNARD SPIRO.

University of North Carolina: GUS PALMER, JR.

Ohio State University: WILLIAM O. FAHRENBRUCK AND CAREY E. LINDSAY.

Sarah Lawrence College: MARY F. WALTER.

* Indicates former member of The Society rejoining.

ROSTER CHANGES DURING JUNE*

Personal

BLUE, JOHN T., 2805 Rathbun Dr., Toledo, Ohio (East Liverpool, Ohio)

BRAY, KENNETH J., Wenczel Tile Co., Trenton, N. J. (Rossmoyne, Ohio)

CAMPBELL, G. DONALD, 1201 Freeport Rd., Tarentum, Pa. (Clarksburg, W. Va.)

CURLL, DANIEL B., JR., Rumford Chemical Works, Rumford, R. I. (Swarthmore, Pa.)

GREEN, M. EDWARD, 527 N. Cottage St., Taylorville, Ill. (Ames, Iowa)

HULTS, EUGENE A., Box 615, Bristol, Va. (New York, N. Y.)

KREIDL, IGNAZ, Dunkirk Glass Works, Dunkirk, N. Y. (Vienna, Germany)

KREIDL, WERNER, Thorium Ltd., Great Westminsterhouse, Horseferryroad, London, SW1, England (Vienna, Germany)

MUNRO, R. ARCHIBALD, North American Refractories Co., 1012 National City Bank Bldg., Cleveland, Ohio (Lock Haven, Pa.)

PRIEST, HARRY C., Box 59, Aldershot, Ontario, Canada (Saskatoon, Saskatchewan, Canada)

ROSLUND, JAMES A., National Fireproofing Corp., Port Murray, N. J. (East Canton, Ohio)

SHIMER, J. B., 33 Blaisdell Ave., Pawtucket, R. I. (Corning, N. Y.)

SWENTZEL, JOHN P., Lewiston, N. Y. (Niagara Falls, N. Y.)

* Address in parentheses is the former address.

CERAMISTS HONORED BY UNIVERSITIES

PRESENTATION OF GEORGE WASHINGTON MOREY FOR THE HONORARY DEGREE OF DOCTOR OF SCIENCE

BY M. E. HOLMES

In 1909, a young man was graduated from the University of Minnesota who, unpredicted by himself or his professors, was destined to become and has become one of America's foremost scientists.

First, in the United States Bureau of Standards and then, for the past twenty-seven years in the Geophysical Laboratory of the Carnegie Institution of Washington, he has been carrying on profound fundamental research in science. He is the author of seventy-nine scientific papers dealing with the subjects of calorimetry, the manufacture of liquid air, the water-silicate system at high temperature, and particularly the phase-rule equilibria of silica systems as they bear upon the fundamentals of glass technology.

These seventy-nine papers measure up to such high scientific standards that they would constitute an enviable lifetime achievement for any scientist and abundantly qualify their author for an honorary degree, but all of them are exceeded in importance by his latest book entitled, Properties of Glass. Although this book has been off the press but a few months, it is already challenging the attention of scientists throughout the country. It is hailed as the classic, the outstanding book of all time on glass technology, and it has put American glass technology literature ahead of that of all other nations. It is the kind of publication that lends support to the claim that the scientific pen when wielded by a master is mightier than the sword, no matter who wields it.

His achievements and qualifications have already been recognized. During the War, the government needed optical glass, and he was delegated to produce it. He developed a process for optical glass manufacture which is still standard industrial practice. In 1936, Yale University required his services above that of all others in preparing a publication on the work of J. Willard Gibbs. He functioned as the glass technology expert in the preparation of the International Critical Tables. On ten occasions, scientific books have been referred to him for authoritative review. In 1927, he was awarded the Hildebrand Prize in Chemistry.

His work has expanded the horizons of our scientific world in a most noteworthy way and that is very important. More important, however, are the foundations on which these horizons spread. Therein lies the chief value of his achievements. Most of his research work has been of that rare, profound, fundamental character which delves deeply into the basic fundamentals of science, and creates new bases for our modern scientific education and technologic industry. The applications of the fund of scientific knowledge which he has created ramify extensively into all branches of science and industry wherever silicate chemistry is important. As such, its value can not be estimated in ordinary units. It is monumental and stands as an enduring inspiration to all young scientists.

(1939)

It is fitting that Alfred University, operating as it does a department of glass technology in its Ceramic College and pursuing the policy that it does of recognizing outstanding achievements in the field of ceramics, should be the first university to extend formal recognition to this distinguished researcher, scientist, scholar, and author.

CHARLES FERGUS BINNS MEDAL TO VIKTOR SCHRECKENGOST

The award of the Charles Fergus Binns Medal is not the ordinary award of an ordinary Medal. It is a reverent tribute to the memory of a great man. In that tribute all people of Alfred University join both individually and collectively.

The award of the Medal also serves the purpose of recognizing distinguished achievements in ceramic art by the medalist.

The Medal is awarded by a jury consisting of representatives of the National Terra Cotta Society, The United States Potters Association, The American Ceramic Society, and the Ceramic Guild of Alfred University. The members of the jury nominate the candidates and then ballot until one is chosen. The objective is to select the most distinguished ceramic artist in America who has not previously received the Medal.

The Medal this year is awarded to Viktor Schreckengost. Viktor Schreckengost is head of the Department of Design of the Cleveland School of Art and instructor in stage design at Western Reserve University. He won the Cleveland Museum of Art European Travel Scholarship and has studied extensively abroad. For each of the past eight years, he has won first prize for ceramic sculpture at the Cleveland Museum of Art. Last year he won first prize for ceramic sculpture at the National Robineau Exhibition. Specimens of his work which have been included in the traveling exhibition of ceramic artware have won high approval. Mr. Schreckengost is also consulting designer for the Seabring Pottery Corp. Both Fairs commissioned him to do design work. His ceramic art work is of the highest order.

CERAMIC ASSOCIATION OF NEW YORK SENIOR THESIS PRIZE

The Ceramic Association of New York annually presents a cash prize for the best thesis submitted by senior students in the Departments of Glass Technology and General Ceramic Technology and Engineering of the New York State College of Ceramics.

The prize is awarded by a committee of the Association consisting of Edward Schramm, Onondaga Pottery Co., J. C. Hostetter, Hartford-Empire Co., and G. J. Easter, Carborundum Co.

J. C. Hostetter, Vice-President of the Association this year, presented the prize which had to be divided between two theses because of a tie vote by the Committee.

The theses and their authors are as follows:

(1) "A Study of Volatization of Glaze Constituents by Use of the Spectrograph," by DONALD J. TUCKER and WILLIS LAWRENCE.

(2) "Effect of Metallic Aluminum on Properties of Magnesite-Chromite Refractories," by BERNARD SPIRO and LUCIUS C. WASHBURN.

OREGON STATE COLLEGE HONORS GLEN LUKENS

Oregon State College in Corvallis, Ore., is a technical school, which on May 29, 1939, conferred the Honorary Degree of Doctor of Science upon Glen Lukens of Los Angeles, Calif.

Of this event, Mr. Lukens writes as follows:

"In writing up any award one must, of course, search for the other implications and the deeper significance involved rather than the awarding of a doctor's degree. The degree is the culmination of a series of important events in the work of hand crafts in America. I feel sure that you must know that through the work of the Federal Art Project thousands of people in America today are producing fine handmade pottery, metalwork, enameling, weaving, carving, and the splendid old art of book binding is receiving new stimulus. When you add to the Federal Art Project the impetus that comes from strong art teachers in the public schools, professional art schools, and universities you gain a clear concept of the great number of people who are biologically and emotionally cut out for craftwork. These workers make up a smaller group of industrialists than the manufacturing group, but they are quite as significant. The only difference in the two groups is the manner in which their productions are marketed.

"On June 2, the directors of the Decorative Arts Section of the San Francisco World's Fair came to Los Angeles to help formulate plans for merchandising the work of the many hundreds of craftsmen, many of whom are represented in the World's Fair exhibits. European sources of art production are being closed to us because of world disturbance, and brokers and retailers come to my office daily asking where art pottery and ceramic sculpture may be had, and I have to answer, 'Yes, where, indeed?'

"I have held monthly meetings this year attended by craftsmen in all media, hoping to evolve a plan whereby the potter who does one hundred and fifty pieces of fine work each year may sell his productions for cash and return to his wheel and kiln and produce more pots. Certain retailing publications have written up the details of these meetings understandingly, and much attention is being directed at us to see what will be done about this problem of selling.

Glen Lukens, University of Southern California

"One great need has always been apparent and that need is 'favorable opinion'—not public opinion—sympathetic understanding from all who work in the field of ceramic art. In America, a hand crafter has always been classed with lonely, half-understood individuals who sit whittling wooden ships which they somehow squeeze into wine

bottles for the amazement of others. Craft workers now are being grouped for work by the Federal aid under such groups as the Hood River, Oregon, and Hand Crafters, and recently through the efforts of certain Oregon women, a strong ceramic center is thriving in Portland.

"The great courtesy which Oregon State College paid me by awarding a doctor's degree in ceramics is balanced by their great vision of the 'near-at-hand day' when homes everywhere will hold either, or both, kiln, wheel, anvil, loom, bookbinder's press, or bench for turning out yards of screen-processed textiles and all other equipment for doing fine things by hand to make living happier for all.

"Oregon State College conferred an honorary degree on the recognition of the dignity of labor, that distinctive accomplishment which makes man different from his cousins, the lower animals. That is why a respect for the work of the hand has remained as an instinct in so many of us.

"In its heart Oregon State College holds a vision of the happy day when leisure may be made exciting and profitable through the manipulation of simple hand equipment, whether it be loom or wheel or hammer."

Glen Lukens Autobiography

Out of a life of hard work, it is not easy to select occurrences which are significant, incidents that have been important in weaving the pattern. Of those few incidents, many seem terribly like the background of my youth, a background of southern hills, rocks, and later on the barrenness and ugliness of Middle Western life as it was lived twenty years ago. That background was one of rural life so unconditional that there was never any choice. It had to take hold of the earth and so, of course, it thrived. It did this very thing, regardless of the barrenness or the fertility of the soil; and when my father discovered that I was learning to make pottery he observed dryly that it was the clay hills speaking, only that he himself had always tried to grow corn from what I was using.

List of Awards

First award: National Robineau Society, 1936; numerous art society awards in the Far West; and citation from Society of Designer Craftsmen, 1938, for "having reached a new high in Ceramic Art in America today."

The activities one engages in are of necessity those which promote interest in the craft as well as to raise the level of craftsmanship and design.

For two years I have worked with Reginald Poland, Director of the San Diego Museum of Fine Arts, and we have exhibited each year an All-California Exhibition of Ceramics.

I have conducted open forums in the University of Southern California to which all ceramic and other craft workers and teachers from the schools have been invited. We studied the marketing angle of our craft, hoping to find a sales outlet for production.

I have taught in high school in Minnesota and in high school and junior college in Fullerton, Calif., and for four years have taught ceramics in the University of Southern California.

We have had strong coöperation from the large clay-working industries around Los Angeles, chiefly from the Gladding, McBean, & Company, the Pacific Clay Products Company, and the Vernon Kilns.

I have urged a closer contact of design or fine art expression in ceramics, hoping to see the day when design and pattern would catch up with technique.

The Christian Science Monitor of May 23, 1939, comments on the Second All-California Ceramic Show as follows:

"Glen Lukens excels in the science of his craft and, indeed, has much to teach the world. Through years of patient research with clays and glaze materials from the deserts of the Southwest he believes that he has rediscovered many a lost ceramic secret, such as the ancient mysteries of blue and yellow. He has produced many new effects in color, tone, and texture, but his facility never carries him into superficial or tricky effects. He is clear cut about the means and ends of his art, and in all his work there is an authentic, downright beauty in which color, texture, form, and function are completely integrated."

HEINRICH RIES ELECTED EMERITUS LIFE MEMBER OF A.A.A.S.

Heinrich Ries was elected an Emeritus Life Member of the American Association for the Advancement of Science at its meeting held at Richmond last December. Emeritus life memberships are created from the income of a fund left to the Association by Miss Jane M. Smith, who before her death resided in Pittsburgh. Ordinarily the income from this fund will provide for three or four emeritus life memberships annually.

G. H. MC INTYRE EARNS PH.D.

G. H. McIntyre, Director of Research at the Ferro Enamel Corp., Cleveland, Ohio, has completed the requirements for his doctorate and was awarded the Doctor of Philosophy degree at Western Reserve University, June 14, 1939. The subject of his dissertation was "Fundamental Reactions Involved in the Formation of Porcelain Enamels."

UNIVERSITIES ANNOUNCE CERAMIC DEGREES, 1939

University of Illinois

Doctor of Philosophy in Ceramic Engineering: A. E. BADGER, F. V. TOOLEY, C. G. HARMAN, and C. H. ZWERMANN.

Master of Science in Ceramic Engineering: B. BARD, H. J. BECKEMEYER, J. F. WHITE, F. M. FRAULINI, and R. L. SHUTE.

A. J. SHORTER and R. W. GATES will receive Masters' degrees in October, 1939.

Professional Degree of Ceramic Engineer: R. L. SHUTE.

Massachusetts Institute of Technology

Doctor of Philosophy in Ceramics: SIDNEY SPEIL.

Virginia Polytechnic Institute

Master of Science in Ceramic Engineering: T. CARTER VAUGHAN.

J. F. WRIGHT, JR., received the degree of Bachelor of Science in Ceramic Engineering with honors.

New York State College of Ceramics

Honorary Degree of Doctor of Science: GEORGE W. MOREY.

Charles Fergus Binns Medal: VIKTOR SCHRECKENGOST.

Professional Degree of Ceramic Engineer: ERNEST K. KNAPP and ROBERT F. SHERWOOD.

Montana School of Mines

Master of Science in Ceramics: CHARLES W. DOUGAN.

Ohio State University

Doctor of Philosophy in Ceramic Engineering: W. H. EARHART, Columbus, Ohio (B.Ch.E., 1935, and M.Sc. in Ceramics, 1936, Ohio State Univ.); MAX M. MÜLLER, Schaffhausen, Switzerland (Diploma Engineer Mechanical Engineering from Swiss Federal Institute of Technology (E.T.H.), Zürich, 1935); and RALSTON RUSSELL, Pomeroy, Ohio (B.Cer.E., 1932, and M.Sc. in Ceramics, 1933, Ohio State Univ.).

Master of Science in Ceramic Engineering: SYDNEY J. BROOKS, Cleveland, Ohio (B.Cer.E., Ohio State Univ., 1938); JOHN F. DAY, Columbus, Ohio (B.Cer.E., Ohio State Univ., 1938); NORMAN L. HALDY, Columbus, Ohio (B.Cer.E., Ohio State Univ., 1938); and FREDERICK A. PETERSEN, Chicago, Ill. (B.S. from Univ. of Illinois, 1937).

Professional Degree of Ceramic Engineer: PROBERT W. DAGER, Champion Spark Plug Co., Detroit, Mich. (B.Cer.E., 1929); MELVIN S. LUND, Colonial Insulator Co., Akron, Ohio (B.Cer.E., 1929); C. E. MCMULLEN, Carborundum Co., Niagara Falls, N. Y. (B.Cer.E., 1928); WALTER C. RUECKEL, Battelle Memorial Institute, Columbus, Ohio (B.Cer.E., 1929; M.Sc., 1930; Ph.D. 1933); WALTER H. SCHOTTS, Allied Engineering Co., Crooksville, Ohio (B.Cer.E., 1927); and GEORGE SYLVESTER, Allied Engineering Co., Cleveland, Ohio (B.Cer.E., 1926).

University of North Carolina

Bachelor of Science in Ceramic Engineering: W. C. CRESS, B. S. TUCKER, J. P. SAWYER, JR., W. A. SCHOLES, J. A. HEDGPETH, GUS PALMER, JR., C. M. LAMBE, JR., W. H. ELLIS, and J. D. LANGDON.

Pennsylvania State College

Doctor of Philosophy in Ceramics: CHO-YUAN LIN (Thesis: "Effect of Various Catalysts on the Conversion of Quartz to Cristobalite and Tridymite at High Temperatures").

Master of Science in Ceramics: MRS. META GLASSER NEUBERGER (Thesis: "Study of the Beneficiation of a Glass Sand by the Froth Flotation Method").

University of Washington

Master of Science in Ceramic Engineering: ARTHUR DAMMANN.

Master of Science in Ceramics: MELBOURNE K. BLANCHARD.

MISSOURI SCHOOL OF MINES AND METALLURGY

Allen P. Green, Sr., Awards

A. P. Green, Sr., President of the A. P. Green Fire Brick Co., Mexico, Mo., has made available two Allen P. Green Awards for the outstanding senior and junior students at the Missouri School of Mines and Metallurgy.

The Senior Award was presented to William Reid Ellis of the Department of Electrical Engineering. The Junior Award was made to Philip Leber, a junior in Petroleum Production Engineering.

The Awards were presented at graduation exercises held May 23, 1939.

NECROLOGY

ARTHUR VAN HENRY

Arthur Van Henry died in Atlanta, Ga., on May 22, 1939, following a long illness. On April 20, 1939, Dr. Henry requested an indefinite leave of absence from his position as professor and director of the Department of Ceramic Engineering of the Georgia School of Technology. It was a last desperate effort through medical help and rest to regain the health he lost during his service in the World War.

Education and War Service

Dr. Henry was born in Columbus, Ohio, on June 2, 1892. He received his elementary education in the Columbus schools. From 1910 to 1914, he attended Ohio State University, graduating with the degree of Bachelor of Science. As part of his collegiate activities, Dr. Henry held membership in Delta Sigma Phi, Gamma Alpha, and Scabbard and Blade.

From 1914 to 1917, he was ceramic engineer on tests at the Pittsburgh Testing Laboratory, Pittsburgh, Pa., and from 1917 to 1920, he served as captain with the Sixtieth Coast Artillery in the United States Army.

He returned to Ohio State University in 1920 to obtain his M.S. and Ph.D. degrees, during which time he held a Fellowship in the U. S. Bureau of Mines. He had the distinction of being the first man in the United States to receive his doctorate in ceramics, this in June, 1923.

Work at Georgia School of Technology

When the Department of Ceramic Engineering at the Georgia School of Technology was founded on February 1, 1924, A. V. Henry was called to Atlanta to become director of the Department, and he continued to serve in this capacity until his death. He took an active part in industrial and technical affairs in the south. He supervised the ceramic sections of two geological surveys of Georgia, worked as a research assistant in the United States Bureau of Mines, and was consulting engineer for the Central of Georgia Railway.

American Ceramic Society Membership

Dr. Henry became a member of The American Ceramic Society in 1914; he was elected a Fellow of this Society in 1931. In 1927, he was Chairman of the Research Committee and he was a member of the Standards Committee on structural clay products for approximately ten years preceding his death.

Arthur Van Henry

At the time of the Annual Meeting of The Society held in Atlanta, Ga., A. V. Henry served as Chairman of the Exhibit Committee and as assistant to Dr. Brittain, President of the Georgia School of Technology and Chairman of the Executive Annual Meeting Committee.

Technical Society and Social Affiliations

Dr. Henry was also a member of Sigma Xi, Phi Kappa Phi, Keramos, Georgia Academy of Science, American Refractories Institute, American Society for Testing Materials, and the Society for Georgia Archaeology. He also served on a committee of the Tennessee Valley Authority. He held memberships in the following social organizations: Scottish Rite, Shrine, American Legion, the Emergency Officers of the World War, and the "Forty and Eight" organization. He was also a director for the Camp Fire Girls.

Publications

"Electric Resistivity of Refractories," *Jour. Amer. Ceram. Soc.*, **7** [10] 764–82 (1924).

"Microscopic Study of Stresses in Glazes," *ibid.*, **8** [2] 117–21 (1925).

"Development of Ceramic Industries in the South," *Mfrs. Record*, **95** [5] 45–47 (1929).

"Ceramics in the South," Georgia School of Technology, 1936.

With W. H. Vaughan, "Geologic and Technologic Aspects of the Sedimentary Kaolins of Georgia," *Amer. Inst. Mining Met. Engrs., Tech. Pub.*, No. 774, 11 pp. (1937); *Mining Tech.*, **1**, No. 1 (1937).

"Structural Control of Georgia Kaolin Refractories" (in preparation).

Memorial Services in Atlanta

A memorial service for Dr. Henry was held in the Y.M.C.A. Chapel at the Georgia School of Technology on Tuesday, May 23. The entire school was dismissed during the hours of the funeral. Dr. M. L. Brittain, President of Georgia School of Technology, had appointed the following men to act as pall-bearers: W. H. Vaughan, Lane Mitchell, N. A. Herod, C. F. Wysong, L. A. Tedder, and A. D. Adair. The following were appointed as escorts from the general faculty: Dr. M. L. Brittain, Dean W. Vernon Skiles, Dean Gilbert H. Boggs, Miss Harriett Henderson, Mrs. J. H. Crosland, and Registrar H. H. Caldwell.

The entire student body of the Ceramic Engineering Department served as an escort, and six members of the Atlanta Post No. 1 of the American Legion.

The body was accompanied from the funeral home by the pall-bearers and was met at the Chapel by the escorts who were lined in double-flank formation. The casket was covered with a blanket of roses, Easter lilies, and valley lilies sent by the faculty of the School. A soloist sang "Lead Kindly Light" and Reverend Ryland Knight of the Second Ponce de Leon Church of Atlanta read scripture, including the Twenty-Third Psalm and verses from II Timothy, Chapter 1. Dr. M. L. Brittain delivered a eulogy concerning Dr. Henry. He also read a letter from the State Department of Mines, Mining, and Geology praising the services and coöperation of Dr. Henry in developing the mineral and natural resources of Georgia. He recounted the first days of Dr. Henry at Georgia Tech and enumerated many of his accomplishments. He told of his services to his country in the time of war and the wound which finally proved fatal. He told of the love his adopted State, Georgia, held for Dr. Henry, and the love returned by Dr. Henry to the State.

The services were closed by another song, "Abide with Me."

The body was escorted back to the funeral home where a guard of honor, composed of ceramic engineering students, remained until the casket was taken to the train. The escort followed the casket to the train and waited until the train left.

Burial in Columbus, Ohio

Funeral services were conducted in Columbus, Ohio, the afternoon of May 23 at the Schoedinger Funeral Home. Dr. J. Harry Cotton of the Broad Street Presbyterian Church officiated. Services at the Green Lawn Cemetery were conducted by Dr. Cotton and by Commander Paul C. Seelig and Chaplain Thomas R. Jenkins of the Franklin Post No. 1, American Legion, with a firing squad and bugler from the Federal troop, Fort Hayes Barracks, Columbus, Ohio.

The honorary pall-bearers were A. S. Watts, G. A. Bole, J. L. Carruthers, W. J. McCaughey, D. J. Demorest, and R. C. Purdy.

Active pall-bearers from Franklin Post No. 1 were Cliff Hough, Ernest Foster, George Legg, Al Bohlander, George Wolfe, Jay Demarest, and Chaplain Jenkins.

TRIBUTE TO A. V. HENRY

To the Family and Friends of Arthur Van Henry, Ph.D., 726 Franklin Ave., Columbus, Ohio

The Staff Members of the Department of Ceramic Engineering of the Georgia School of Technology wish to express deep appreciation and high regard for their social and professional associations with Arthur Van Henry.

He exhibited in every respect a kindliness, courtesy of consideration, and ability to draw fine lines of discrimination which characterize the gentleman. Moreover, the respect and esteem in which he held others was returned in abundance by those of us who were professionally associated with him in the development of human and mineral natural resources of the southeastern section.

Arthur Van Henry contributed much to the development of this, his adopted State, which he loved so dearly. In this work, as in his life, he exhibited the fine influences of family, former teachers, and friends. To those of you who contributed any part to the fine man he was, we, his associates for a period of years, wish to express our deepest and heartfelt appreciation together with a mutual sympathy in our loss.

In his teaching and leadership, he has built an intangible monument in the lives of former students and associates who are at work all over the United States.

In a more tangible way, his efforts have built the Ceramic Engineering Department at the Georgia School of Technology, the first head of the first department of this kind south of the Ohio River. In memoriam, we wish to dedicate this building to the causes for which he lived and labored, naming it the "Arthur Van Henry Ceramic Engineering Building."

He lived and died as a worthy and patriotic soldier, whether in the line of battle or in the line of education and example. Shy, uncomplaining, possessed of dignity, reserve, and integrity, those of us who follow him and were associated with him in his work at the Georgia School of Technology accept this challenge to grasp the tools laid aside by him to mold a serviceable future for others, ever his worthy objective.

—W. Harry Vaughan, Lane Mitchell, L. A. Tedder, Julian H. Harris, and Charles F. Wysong

Senior Class in Ceramic Engineering, Georgia School of Technology, 1939. *Front row (left to right)*: M. J. Scavens, R. B. Williams, H. B. Grace, D. L. Nowell, J. M. Teague; *back row*: Professor Lane Mitchell, Technician L. A. Tedder, P. M. Potter, R. E. Camp, Professor W. H. Vaughan

FRANK E. HODEK

Frank E. Hodek, father of Frank E. Hodek, Jr., passed away on March 9, 1939, on the west coast of Florida, where he had gone for his health. He was born on the near west side of the city of Chicago, January 4, 1868. Being the second oldest in the family of five brothers and two sisters meant that early in life he was to take up his share in helping to provide for the necessities of life. As a result, his schooling ended and his days of work began when he was eleven years old.

His first position was with a fairly large department store on the west side where he started in as a cash boy. At the age of fourteen, he was made a helper to the window trimmer, and at seventeen he was a salesman in one of the departments of the store. Three years of clerking, and then followed a promotion to the position of buyer.

Frank E. Hodek, Sr.

When he was twenty-four years old, he severed his connections with this store, and having borrowed sufficient capital, opened his own place of business in what was then on the western outskirts of Chicago. He leased a small store with living rooms in the rear and there started his business career. The dry-goods business soon outgrew the original 25- by 40-foot store, so that in 1895 a larger store in the same neighborhood was secured. Hard diligent work and attention to business brought results, and by 1905 several additions were made to the dry-goods store, and a general line of merchandise was carried; in 1910 a second store was started in one of Chicago's west side suburbs.

In 1915 came the urge to retire from active business, and after the usual "going-out-of-business sale" the merchandise remaining was sold at public auction. In July of that year with his family he started west to San Francisco, being among the early pioneers to attempt this trip by automobile. After many road difficulties and four weeks of travelling, San Francisco was reached. The automobile used was placed on display at the Fair for the remainder of the stay on the West Coast.

Upon returning to Chicago in November, his attention was directed to the possibilities of the porcelain sign business. In March, 1916, he took over the active management of the General Porcelain Enameling & Mfg. Company, and again he found himself in the center of business activity. The business grew and prospered to the extent that in 1918 another furnace was added to the little one-furnace shop; in 1923 the business moved into its own building on the northwest side of Chicago. From 1923 to 1936, seven additional buildings were added, so that when the last addition was finished, the Company was occupying 100,000 square feet of manufacturing space and was using four furnaces.

In 1932, Mr. Hodek purchased the entire assets of Steffenguide, Inc., a highway advertising company; in March, 1937, he became president of the Century Vitreous Enamel Company, and in January, 1938, he acquired the now Neon Displays, Inc., Company of Milwaukee, all three companies being closely affiliated with the General Porcelain Enameling & Mfg. Company.

Mr. Hodek was active daily in the several companies in which he was interested. The first break in his health occurred in December, 1938, at which time what was then termed a slight internal ailment necessitated his going to a hospital, where within the following five weeks he underwent two operations. Seemingly recovered from this sickness, the doctor ordered a sojourn to sunnier climates with the idea of a speedier return to his former robust health. Three weeks on the West Coast of Florida improved his health, and then without warning, on the night of March 9, 1939, death spread his mantle over one whom we all knew as a true husband, a real father, and an honest, upright and fair dealing business man. He is survived by Mrs. Amelia M. Hodek, his widow, and Frank, Jr., his son.

CERAMIC HISTORY

HISTORY OF PLATE-GLASS MANUFACTURING AND OF CAPTAIN JOHN BAPTISTE FORD*

Originated in France

The invention of plate glass occurred in France toward the close of the Seventeenth Century. The idea of manufacturing a plate of glass was conceived by Abraham Thevart and Lucas de Nehou, who contrived to pour glass while in fusion upon a table and to flatten it by a roller. It was the desirability of producing larger and thicker sheets than was possible by blowing that led to Nehou's invention. The first plate glass was produced in 1668 near Paris in a factory which later became a part of the St. Gobain Company.

The process of manufacturing cast plate, originating in France, was soon adopted in other European countries, but the industry did not attain any commercial importance until the Nineteenth Century. During the Eighteenth Century, the principal use for such glass was in the manufacture of mirrors, but the market for them was limited. The high cost of producing cast plate, the difficulties of transportation, and the many imperfections in the glass itself precluded its use during this period as a glazing material. It could not compete with blown window glass, the production of which had become firmly established throughout Europe.

*From "Flat Glass and Related Glass Products, a Survey Covering the Principal Producing and Trading Countries, with Particular Reference to Factors Essential to Tariff Consideration," Report No. 123, Second Series. Issued by United States Government Printing Office, Washington, D. C., 1937.

In the Nineteenth Century, improvement in furnaces and the substitution of coal, and later of gas, for wood as a fuel gradually stimulated the production in Europe of plate and window glass. By the end of the Nineteenth Century, Belgium had attained first rank as a producer of these products, particularly blown window glass, and French mirror plate had become famous throughout the world for its quality.

In the United States

Plate glass had been produced in several establishments prior to 1880, but it was not until 1881, when John B. Ford built a large factory at Creighton, Pa., using natural gas as a fuel, that plate glass was produced on a successful basis. The profits derived from this business in the next few years caused such a boom in the construction of plate glass factories—a movement further stimulated by the discovery of natural gas in Indiana in 1890—that by 1893 there were twelve plants manufacturing plate glass in the United States. Rapidly increasing production caused keen competition among domestic producers and a period of low prices followed. In 1895, this condition led to the consolidation of a number of plants into one company. the Pittsburgh Plate Glass Company.

CAPTAIN JOHN B. FORD FOUNDED PLATE-GLASS MANUFACTURE IN AMERICA

From a history compiled by John B. F. Bacon in 1935 and made available for this abstracting by John B. Ford, Jr., Vice-President of the Michigan Alkali Company, Wyandotte, Mich.

Captain John Baptiste Ford, versatile manufacturer and "father of the plate-glass industry in America," belongs to that sturdy class of pioneers, who, reared in the midst of hardship, attained marked success in manhood. Our country owes much and is justly proud of this pioneer manufacturer. His span of life covers that interesting period in our history from 1811 to 1903 when frontiers were being changed, when population was mounting, and when the markets for manufactured goods were rapidly expanding.

Born in Danville, Ky., on November 17, 1811, Captain Ford began life in a section of the country where life held little for those who were not able to cope with the hardships of a new land. Had he been born nineteen years earlier, he would have been classed as a Virginian because that section now known as Kentucky was then a portion of the proud state of Virginia. That his early environment had an influence in developing certain traits of character and in shaping the course of his life is admittedly open to question. It can be justly pointed out, however, that his venturesome spirit, his determination, and his remarkable energy are characteristics derived from his pioneer stock.

In these days when more interest is being taken in how our forefathers lived, life in early Kentucky presents a particularly fascinating picture. Virginia's Fincastle County stretched out far to the westward beyond the mountains. A settlement had been started at Harrodsburg in 1744, and Daniel Boone with twenty others had reached the Kentucky River and had begun building the town of Boonesboro. Prior to 1775, there were only 150 emigrants in this large area, and there were no women. In the same year that Harrodsburg was started, a man named John Crow built a log house ten miles away at a point that was to mark the location of Danville. It was at Danville later that several conventions were held over a period of six years. The last of these finally succeeded in getting the Virginia Legislature to pass an act of separation with the result that Kentucky became a separate state in 1792. The year 1811 saw the people of Danville still clearing the land, raising their own food, and making their own clothing, with encounters with Indians fresh in their minds.

(1939)

Jean Baptiste is mentioned frequently in the early records. According to "Old Kentucky Land Grants," Baptiste received a grant of 300 acres located on the watercourse of Drakes Creek, under the survey of November 5, 1797. This was in recognition of three years of military service in the Virginia Continental Line, which would indicate that he participated in the Revolutionary War.

Two daughters were born to Jean and Hannah Baptiste. According to Lincoln County records, Margaret married Jonathan Ford on August 10, 1807. She was probably little more than sixteen years of age at that time. Sarah, born in 1794, married Benjamin Durham, August 23, 1827. He was a member of a prominent Virginia and Kentucky family. By a former marriage Durham had a son, Milton J., who at one time served as Comptroller of the Treasury. Elizabeth (Betsy), the stepdaughter, married John DePauw on July 6, 1805. Their son, Washington, was at one time associated with Captain Ford and later endowed Asbury College, which thereafter became DePauw University.

Little definite information regarding Jonathan Ford is available. The census of 1810 definitely locates him at Danville, but he does not appear in the census of 1820.

Jonathan Ford is said to have left Danville shortly before Christmas, 1814, to join the Kentucky troops that journeyed down the Ohio and Mississippi rivers to meet the British in the closing days of the War of 1812. No word was ever received from him, and it was assumed that he was one of the large number of Kentucky soldiers to perish. The absence of his name in the census of 1820 tends to substantiate this assumption. A striking picture is presented by this pioneer ancestor answering the call of his country in his homespuns just as his wife was to bear their fourth child.

Early Life

Captain Ford was but three years old when his father left home, never to return. Fortunately Jean Baptiste was still alive, and Margaret Ford, uncertain as to the fate of her husband and her apparent state of widowhood, dwelt with her four children on the road leading from Danville to Perryville, where her father's vineyards were located. It was a backwoods setting, but the emphasis placed on right and wrong in those surroundings left an imprint unsurpassed today.

In Danville at that time was a man named John Jackson

who made harness and saddles. Thinking that harness-making would probably offer more opportunities than farming, Margaret Ford, according to the common practice of that time, arranged to apprentice her second son, John Ford, to John Jackson so that he might learn a trade that would serve him through life. John Ford was a small boy and during the first years apparently profited from the apprenticeship. It is said, however, that Jackson began to mistreat the boy and failed to fulfill a promise to permit him a limited amount of schooling.

Prompted by a boylike spirit of adventure and a determination to put an end to the unpleasant association with the saddler, John Ford's venturesome spirit asserted itself in his middle teens, and he ran away. Louisville, then several days distant, attracted him, and after a wearisome tramp he succeeded in reaching his objective only to be told that he must leave Kentucky if he was to avoid the risk of being forced to return to Danville. Indiana, so near at hand, seemed to present the needed haven of refuge, and after succeeding in making a bargain with a boatman to ferry him across the river to New Albany in exchange for a deck of cards, John Ford reached the state that was first to see him gain prominence.

Once in Indiana, the urge to remove himself farther from Danville left him, and his problem became that of looking for employment. Twelve miles northwest of New Albany in the small town of Greenville was a saddler's shop. Captain Ford succeeded in convincing the saddler of the worth of his services. Thanks to the training received from John Jackson, the boy was given work, which proved a far pleasanter experience than his apprenticeship days. His work pleased the saddler, and he progressed to such an extent that in the course of time the runaway boy took over his employer's shop.

In Greenville lived a kindly man named Benjamin Bower who was attracted by John Ford's energy and ability. He saw how badly the boy's schooling had been neglected and set about to remedy as much as he could this serious deficiency. It was due to the kindly influence of Benjamin Bower and his wife that the young saddler's studies were carried to the point where they were of some value to him.

Greenville Ventures

Now follows a succession of events that illustrate Captain Ford's versatility and his enterprising spirit. The saddle business grew to the point where he had a number of wagons carrying the products of his shop through the countryside. When the Mexican War began in 1846, he was in a position to help supply the need for more harness and saddles with which to equip the troops. Filled with exuberance over his success as a saddler, he sold out his business and opened a grocery and dry goods store. This led him to become interested in a flour mill with the result that he gave up the store to operate his mill. Not content with milling, he embarked upon an undertaking of making articles of perforated tin, called kitchen safes. This, in a small way, was a manufacturing venture, and it is interesting to note that his talent for manufacturing had now manifested itself. His successive ventures in Greenville had profited, the funds accumulated from one being used to start the next undertaking.

Although he made his departure from Danville filled with resentment and mistrust, it is plain that the runaway apprentice did not forget his mother. Her latter years were spent in Greenville, and she died there in 1840. In 1839, in a record of the transfer of a lot in Danville belonging to the heirs of Jean Baptiste, she is referred to as a resident of Floyd County, Ind.

Iron and Steam Boats

During the fifties, Captain Ford moved from Greenville to New Albany. Here took place a succession of business ventures which, from the standpoint of rapidity of change, closely resembled his activities in Greenville. His ambition to manufacture resulted in his purchasing the patent rights in four states for feed-cutting boxes of a type that was well received by the farmers. He succeeded in manufacturing these on what was considered at that time a fairly extensive scale. But new fields looked brighter, and he next entered into the iron business. This proved to be a profitable move as the products of his foundry and rolling mill went forth into a land that was awakening to the possibilities of iron and steel.

With the Ohio River so near at hand and with its importance as a means of transportation firmly impressed upon the minds of the manufacturers of that day, it seems natural that a man of John Ford's enterprising spirit should become interested in what were then called steamboats—that picturesque type of flat-bottom boat still found on our inland waterways with two high smokestacks abreast of each other and a huge cylindrical paddle wheel across the stern. Without giving up his iron business, he set about to build a boat which when completed bore the name of "The Chancellor." This boat was followed by the "B. J. Adams," the "L. C. Ferry," and the "Will S. Hayes." In addition to building the boats, he became engaged with his two sons in operating them on the Ohio and Mississippi rivers.

So great was his enthusiasm over his expanding fleet that he laid plans for twelve more, each to be named for one of the Twelve Apostles. It was in these days of fascinating river life that he acquired the title of "Captain." Just as the Mexican War found him furnishing harness and saddles, so the Civil War found him furnishing transportation. In this connection, it is interesting to recall that the boat used by General Grant at Vicksburg was one of those belonging to Captain Ford.

Pioneering in Plate Glass

In the year 1860 at Lenox, Mass., an attempt was made to make polished plate glass. The result was a failure because the glass that was produced had little to offer in transparency and smoothness. But the Lenox experiment served one useful purpose, namely, to show that America wanted to manufacture its own plate glass.

How Captain Ford could have sensed that there was to be a growing demand for plate glass and that there would be a chance to compete successfully with those sending it in from abroad would be difficult to understand were it not for the large degree of farsightedness he possessed.

In 1868, he became interested in the subject of plate glass, and his career as a glass manufacturer began. In the following year, he sold out his iron business for what was a large sum of money in that day. These funds enabled him to tackle in earnest the problems of pioneering in plate glass with the result that in 1870 he performed the feat of

producing polished plate glass on a commercial basis for the first time in America. This was accomplished in his factory, known as the Star Glass Company, at New Albany, Ind.

And now follows a period of expansion and its collapse. Withdrawing from the Star Glass Company, he set about to organize a much larger company called the Louisville Plate Glass Company. The extent of this Company's capitalization and its capacity to produce were a tribute to the faith placed in Captain Ford by his associates. Not content with the Louisville Company, another plate-glass factory was launched at Jeffersonville, Ind., but difficulties arose to plague the plate-glass exponent.

The turn in fortune began when the flow of profits that Captain Ford had so earnestly predicted did not materialize. With loss of his prestige as a glass manufacturer, other troubles arose. His readiness to endorse notes for friends and distant relatives during his prosperous years now became a source of additional misfortune. Thus the fruits of his labors disappeared, and when he was practically seventy years of age the successful saddler found himself in the deplorable position of having lost everything.

Plate Glass in Pennsylvania

Probably the most remarkable feature in Captain Ford's life is the way he overcame adversity at an age when most men would have considered themselves too old to start anew. His energy and capacity for work had by no means left him, and off to New York City he went in the hope of selling a patent on sewer pipe made of rough glass. In New York at that time lived Peter Cooper. He was twenty years older than Captain Ford, but considering the degree to which their careers had paralleled each other it is not surprising that they should be attracted to each other. With the kindly assistance of the aged inventor and philanthropist, the patent was sold and a sizable sum was realized.

The trip to New York resulted in his meeting another prominent figure. General and Mrs. John C. Fremont were on the train, and Captain Ford, following a characteristic habit of conversing with those he came in contact with, soon fell to talking with the Fremonts with the result that the distinguished solder agreed to permit him to endeavor to sell some land he held in the West. Captain Ford succeeded in making a sale, and the commission he received proved to be of assistance in his next venture.

Undaunted by his failure to continue in the glass business on the shores of the Ohio River, he set about to interest eastern capitalists in another plate-glass venture. The plans called for a factory, this time to be located on the shores of the Allegheny River above Pittsburgh in a small community named Creighton, where coal and grinding sand were near at hand. The plant was erected in 1880. The company was called the New York Plate Glass Company, with Albert E. Hughes as president and James R. Shields as secretary. The name was later changed to the Pittsburgh Plate Glass Company when John Pitcairn, his cousin Artemis, and others joined the Company.

The Creighton venture did so well that the capacity of the factory became inadequate. This led to building another factory a short distance away at Tarentum and then another farther up the river. The location chosen for the third factory was named Ford City, which in the course of time attained a population comparable with that of Captain Ford's native town of Danville. At Creighton, the pioneer plate-glass manufacturer was joined by his two sons. They were mature business men by this time, having gained valuable experience from their close association with their father since his iron and steamboat days; and at Creighton, as executives, they contributed materially to the success of the Pittsburgh Plate Glass Company.

Oddly enough it was in New York City that Captain Ford, accidentally overhearing a conversation, learned that natural gas had been discovered in Pennsylvania. He quickly sensed the possibilities that this discovery offered to the glass industry, and upon his return to Creighton, he set about to investigate and to experiment with the new fuel. The result was that its adoption at the Creighton factory marked the first use of natural gas for industrial purposes in America. Aside from using it for the manufacture of glass, Captain Ford was one of a group who first brought natural gas to Pittsburgh. MacGougan's well was located sixteen miles south of the city, and to bring the gas that distance entailed placing the largest order for pipe that had been given up to that time.

Bronze Statue from Employees

Captain Ford's manufacturing activities were marked by an absence of disputes with his employees. He was so highly regarded by the workmen that in 1891 at Ford City they voluntarily erected, at their own expense, a handsome bronze statue of him, which was unique in that it was conceived and completed while he was still living. The unveiling, timed to take place on his eightieth birthday anniversary, took the form of an impressive gathering, which included orators and distinguished guests who assembled with the large number of employees.

The following excerpts appeared in a Pittsburgh newspaper the day after the dedication:

"Congressman John Dalzell experienced a moment of inspiration yesterday. As he arose to address an immense outdoor audience at Ford City, he hesitated longer than his usual custom, and he said impressively,

'We meet today for a purpose as remarkable as it is significant. We meet to unveil the statue of a man, the story of whose life and work is characteristically American. He is neither statesman, orator, man of letters, nor military chieftain. He bears no lofty titles, wears no decorations, claims no other place than belonging to a plain American citizen. Nor is he a man of the past receiving tardy, posthumous honors.'

"Mr. Dalzell paused. The spirit of the strange spectacle that Ford City presented this day seemed suddenly to overwhelm him, and with rising voice, uplifted arm, and flashing eye, the silver-tongued statesman resumed,

'Perhaps the strangest feature of all in this unique drama is the relation that exists between the honoring and the honored. Three thousand American workmen would here dedicate to perpetual remembrance the name and the fame of their employer. Well-paid Labor stands with uncovered head to honor just and generous Capital. Here are no frowning faces, no clenched fists, but rather hands clasped upon the even plane of a common manhood.'

"Without doubt Labor and Capital had nowhere on the American continent ever made such a marked demonstration of friendship as this. For six months past, the three

"Erected in Honor of John B. Ford, the Father of the Plate Glass Industry in America, by Three Thousand Employees on the Eightieth Anniversary of His Birth, November 17, 1891."

thousand workmen of the Pittsburgh Plate Glass Company have been subscribing small sums of money among themselves for the purpose of rearing a monument in honor of Captain Ford, the founder of the Company which employs them. The firm was not consulted and was not permitted to have any share in the arrangements beyond being asked to shut down entirely all three factories on Saturday. This was done, and special trains carried the workmen free from Creighton and Tarentum to Ford City, which wore a complete holiday attire.

"Captain Ford and his aged wife sat upon the platform with their sons, daughters-in-law, and grandchildren, and the distinguished guests gathered around them. At the opening of Mr. Dalzell's speech the monument was unveiled by Master George Ross Ford, a grandson.

"The cannon on the hillside boomed at intervals the rest of the day, and the sun set upon one community at least, where Capital and Labor lie down together in peace."

Soda-Ash Manufacturer in Michigan

With the three factories in operation, the matter of supplying them with the materials that enter into the making of glass grew in importance. Coal was to be had in the nearby hills. Gas, as already mentioned, was easy to obtain. Grinding sand could be taken from the river near at hand, and white sand was shipped in from Tyrone. But soda ash remained to be purchased in large quantities from manufacturers who appeared to be prospering. Thus filled with a desire to make this important component part, Captain Ford turned to a new field, scarcely realizing that his genius was to become a factor in a second industry.

Knowing that the success of a soda-ash factory depended primarily on its supply of limestone and salt, Captain Ford set about to locate deposits of these important raw materials in close proximity to one another. The search for salt carried him away from Pennsylvania into Michigan. His faculty of gaining information from chance acquaintances had not left him, and during the course of a conversation he learned of an attempt by a rolling mill at Wyandotte to find natural gas and that, in the course of drilling, a stratum of rock salt had been penetrated.

This small bit of information led to the purchase in 1891 of a tract of land which was just within the southerly boundary of Wyandotte. Captain Ford again was building another factory on the shores of another river.

The Wyandotte venture was given the name of the Michigan Alkali Company with the entire stock divided between the members of his family. It was a discouraging task to reach the point where soda ash could be produced, and the obstacles that had to be overcome often appeared insurmountable. Chemistry was a difficult subject for a man of eighty years to master, but with the aid of wisely chosen assistants he at length succeeded in turning out a satisfactory product. Following what appears to have been his custom of starting another factory after the first had gotten under way, Captain Ford purchased a second tract at Wyandotte, this time just beyond the northerly limits. Here, on a river that ultimately was to furnish valuable transportation, was laid the foundation of what has become one of the country's great soda-ash producers.

And so the one who through adversity had attained leadership in the plate-glass industry saw opportunities in another field, and in the closing years of his life he became a chemical manufacturer. By 1894, the Pittsburgh Plate Glass Company had ceased to receive very much of his attention. A difference of opinion developed in regard to the financial policy of the Company, and in 1897, after the death of his devoted wife, Captain Ford sold his entire interest and withdrew from the glass business. His two sons likewise sold their holdings. Emory Ford retired from active business, and took up his residence in what was then Allegheny; Edward Ford, having already gone to Wyandotte, devoted his time to the new enterprise.

In the development of the Michigan Alkali Company, Captain Ford was assisted by a loyal group of admiring

friends and relatives. In addition to his son, Edward, there were his grandsons, John and Leyden, and Mark R. Bacon and George P. MacNichol, sons-in-law of Edward Ford. Among those to leave the employ of the Pittsburgh Plate Glass Company and cast their lot with Captain Ford in Wyandotte were Captain Samuel Finney, Lincoln Gettleman, John Griffith, Charles Nixon, and John Pilston.

As has been mentioned before, the early days of the chemical company were marked with many difficulties. Once the preliminary obstacles in the way of construction and getting into production were successfully met, there arose litigation over alleged infringements of patents. It is interesting to recall here that it was in a court presided over by William Howard Taft that a favorable decision was finally rendered. Another difficulty to arise was from foreign competitors. There was no tariff on soda ash at that time, and foreign manufacturers, seeing their American market threatened, began to reduce prices below the cost of production in America. Through the efforts of Mark R. Bacon, a duty on soda-ash and alkali products was incorporated into the Dingley Tariff Bill by the U. S. Senate, after having been placed on the free list by the House of Representatives; upon the passage of the act, the Company was no longer at the mercy of foreign competition.

In addition to its primary objective of manufacturing soda ash (sodium carbonate) which entered into the manufacture of soap as well as glass, the Company found itself in a position to enlarge its scope by producing baking soda (sodium bicarbonate) and caustic soda (sodium hydroxide). These three were sold in bulk, and Captain Ford became interested in the possibilities of utilizing his alkalis to make something to be sold in smaller quantities suitable for household use. Thus the J. B. Ford Company was organized at Wyandotte in 1898, and, supplied with sodium compounds from the Michigan Alkali Company, it has become one of the outstanding producers of cleansing preparations.

Notwithstanding the fact that Captain Ford left the Pittsburgh Plate Glass Company with no thought of ever entering the business again, his family oddly enough was destined to be further identified with the plate-glass industry. Edward Ford, after doing much to help his father realize his dream of manufacturing soda ash, became filled with a desire to return to the field in which he had such good tutelage. In 1899, he secured a tract of land on the Maumee River on the outskirts of Toledo, and here was started the Edward Ford Plate Glass Company, which thirty-one years later was to merge with the Libbey-Owens Glass Company to become the chief competitor of the Pittsburgh company.

Upon the retirement of Edward Ford from the chemical business, his son, John, became its active head, and under his able guidance, the Company has steadily progressed. Leyden Ford, whose genius ran to financial matters, became treasurer, and together the cousins worked harmoniously in placing the Company in its admirable position. George Ford became associated with his father at Toledo, and upon his parent's death he represented the third successive generation to head a plate-glass company.

Although Captain Ford spent a large portion of his time during the last years of his life in Wyandotte, he did not give up his home in Creighton. Dressed in his high silk hat and long-tailed coat, the venerable old gentleman was a familiar figure to those traveling between Pittsburgh and Detroit.

Owing to his democratic spirit and his desire to create work for the laboring man, he occupied a unique place in the communities where he was known. A firm believer in the church and a staunch Methodist, Captain Ford expressed his loyalty to his own faith by giving funds for the erection of Methodist churches in Greenville, Danville, Ford City, and Wyandotte. In addition to these, he gave a Presbyterian Church to Wyandotte, a memorial chapel to Allegheny College at Meadville, and an endowed Y.M.C.A. building at Tarentum.

Reminiscent of the ceremony that attended the dedication of the statue on his eightieth birthday, his ninetieth anniversary was impressively observed by meetings composed of friends and admirers held in Tarentum, Ford City, Meadville, and Wyandotte. A tribute from abroad came to Captain Ford in the form of a medal signifying his membership in a French honorary society.

It was at Creighton almost within the shadow of the glass factory he had so fondly built that Captain Ford passed away in his ninety-first year on May 1, 1903, and it was at Pittsburgh in the mausoleum he had built for his family that he was laid to rest by the side of Mary Bower Ford. The versatile manufacturing genius who had striven to make saddles, cutting boxes, iron products, steamboats, plate glass, and soda ash is gone, but there remains much to keep him alive in the hearts of the large number to whom he was a benefactor.

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NOTES AND NEWS

RUTGERS UNIVERSITY

The closing meeting for the year of the Rutgers Ceramic Club and Student Branch of The American Ceramic Society, held May 7 in the Assembly Room of the Ceramics Building, Rutgers University, was featured by election of officers for the coming year and the reading of several papers by students.

Officers in charge of the organization's activities next year will be *President*, ROBERT R. BROOKS; *Vice-President*, ROBERT I. OWEN; *Secretary*, GEORGE E. PEARCE; *Treasurer*, CLARENCE H. HILL; *Corresponding Secretary*, GILBERT GOODMAN; *Faculty Councillors*, GEORGE H. BROWN and JOHN R. KAUFFMAN.

Several papers on student research in the Ceramic Department were read. Hugh M. Cleveland spoke on his investigations into color standardization and its possible applications in the ceramic industries; Edward J. Smoke, on development of a series of red stains for ceramic bodies; and Kenneth T. Greene, on the effect of temperature on the crystalline behavior of a portion of a barium glass triaxial system.

Refreshments prepared by a special committee were served following the lectures.

WEST VIRGINIA UNIVERSITY SUMMER COURSES

Courses in art and pottery are being presented in a summer session from June 12 to June 21 at West Virginia University, Morgantown, W. Va. The courses in pottery were conducted by W. A. Koehler, head of the Department of Ceramic Engineering, and Elizabeth Horvath, instructor. The courses in art are under the direction of Amie H. Doucette, lecturer.

The courses listed for the 1939 summer session can not be taken during one summer. The Director recommends that students applying for these courses make arrangements to take the art course the first year and to follow this with a pottery course during the next summer session.

CENTRAL DISTRICT ENAMELERS' CLUB

At a dinner meeting of the Central District Enamelers' Club held May 19 at the Hotel Carter, Cleveland, Ohio, the following officers were elected for 1939:

President: R. H. SCHWENDLER, Enamel Products Co., Cleveland, Ohio.
Vice-President: J. B. SIMONS, Westinghouse Electric & Mfg. Co., Mansfield, Ohio.
Vice-President: G. FULTON, Alliance Porcelain Products Co., Alliance, Ohio.
Vice-President: R. S. COBB, Moore Enameling & Mfg. Co., West Lafayette, Ohio.
Vice-President: A. W. LEESEBERG, American Stove Co., Cleveland, Ohio.
Vice-President: W. J. LEIGHNER, Strong Mfg. Co., Sebring, Ohio.
Secretary-Treasurer: G. PFLEGER, Harshaw Chemical Co., Cleveland, Ohio.

—R. T. HENDRICH, *Retiring Secretary*

PORCELAIN ENAMEL INSTITUTE FOURTH ANNUAL FORUM

The Fourth Annual Forum of the Porcelain Enamel Institute will be held October 18 to 20, 1939, at Ohio State University, Columbus, Ohio.

The Program Committee has considered more than 150 subjects suggested by registrants at previous Forums and by P.E.I. members. It was decided to confine subject matter and discussions to actual enameling shop application rather than to technical or laboratory problems.

Members of the committee are *Chairman*, F. E. Hodek, Jr., General Porcelain Enameling & Mfg. Co.; A. I. Andrews, University of Illinois; J. E. Hansen, Ferro Enamel Corp.; and R. M. King, Ohio State University.

The opening Forum session will be devoted to a "Symposium on Fine-Ground Enamels"; an all-day session on cast-iron enameling will follow, during which time those interested in sheet iron and hollow-ware will meet in a separate section. Several section meetings, among them a session devoted entirely to hollow-ware, will be held in the afternoon.

General sessions are planned for the closing day, October 20. Porcelain Enamel Institute headquarters will be in the Deshler-Wallick hotel.

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NOTES AND NEWS

RUTGERS UNIVERSITY

The closing meeting for the year of the Rutgers Ceramic Club and Student Branch of The American Ceramic Society, held May 7 in the Assembly Room of the Ceramics Building, Rutgers University, was featured by election of officers for the coming year and the reading of several papers by students.

Officers in charge of the organization's activities next year will be *President*, ROBERT R. BROOKS; *Vice-President*, ROBERT I. OWEN; *Secretary*, GEORGE E. PEARCE; *Treasurer*, CLARENCE H. HILL; *Corresponding Secretary*, GILBERT GOODMAN; *Faculty Councillors*, GEORGE H. BROWN and JOHN R. KAUFFMAN.

Several papers on student research in the Ceramic Department were read. Hugh M. Cleveland spoke on his investigations into color standardization and its possible applications in the ceramic industries; Edward J. Smoke, on development of a series of red stains for ceramic bodies; and Kenneth T. Greene, on the effect of temperature on the crystalline behavior of a portion of a barium glass triaxial system.

Refreshments prepared by a special committee were served following the lectures.

WEST VIRGINIA UNIVERSITY SUMMER COURSES

Courses in art and pottery are being presented in a summer session from June 12 to June 21 at West Virginia University, Morgantown, W. Va. The courses in pottery were conducted by W. A. Koehler, head of the Department of Ceramic Engineering, and Elizabeth Horvath, instructor. The courses in art are under the direction of Amie H. Doucette, lecturer.

The courses listed for the 1939 summer session can not be taken during one summer. The Director recommends that students applying for these courses make arrangements to take the art course the first year and to follow this with a pottery course during the next summer session.

CENTRAL DISTRICT ENAMELERS' CLUB

At a dinner meeting of the Central District Enamelers' Club held May 19 at the Hotel Carter, Cleveland, Ohio, the following officers were elected for 1939:

President: R. H. SCHWENDLER, Enamel Products Co., Cleveland, Ohio.
Vice-President: J. B. SIMONS, Westinghouse Electric & Mfg. Co., Mansfield, Ohio.
Vice-President: G. FULTON, Alliance Porcelain Products Co., Alliance, Ohio.
Vice-President: R. S. COBB, Moore Enameling & Mfg. Co., West Lafayette, Ohio.
Vice-President: A. W. LEESEBERG, American Stove Co., Cleveland, Ohio.
Vice-President: W. J. LEIGHNER, Strong Mfg. Co., Sebring, Ohio.
Secretary-Treasurer: G. PFLEGER, Harshaw Chemical Co., Cleveland, Ohio.

—R. T. HENDRICH, *Retiring Secretary*

PORCELAIN ENAMEL INSTITUTE FOURTH ANNUAL FORUM

The Fourth Annual Forum of the Porcelain Enamel Institute will be held October 18 to 20, 1939, at Ohio State University, Columbus, Ohio.

The Program Committee has considered more than 150 subjects suggested by registrants at previous Forums and by P.E.I. members. It was decided to confine subject matter and discussions to actual enameling shop application rather than to technical or laboratory problems.

Members of the committee are *Chairman*, F. E. Hodek, Jr., General Porcelain Enameling & Mfg. Co.; A. I. Andrews, University of Illinois; J. E. Hansen, Ferro Enamel Corp.; and R. M. King, Ohio State University.

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BROWN ONE-COAT, ONE-FIRE PORCELAIN ENAMEL FINISH

A new brown one-coat, one-fire porcelain enamel finish is being made by the Porcelain Enamel & Mfg. Co. It means a saving in production costs, according to reports from the industry which have been verified in the laboratories. After drying, the brown coat may be grained in the bisque and fired at one time. It is especially desirable where lighter gauge metals are used, because the firing temperature is much lower than that ordinarily maintained to obtain a good bond. It covers uniformly and completely and has a good glossy finish. When applied over nickle pickled ware, this new Pemco one-coat, one-fire brown porcelain enamel eliminates any minute imperfections which may be in the metal.

HARLOWE HARDINGE, PRESIDENT, HARDINGE COMPANY, INC.

Harlowe Hardinge, at a meeting of the Board of Directors in New York, N. Y., April 3, 1939, was elected President of Hardinge Company, Inc., York, Pa., succeeding H. W. Hardinge, who is now Chairman of the Board.

Harlowe Hardinge

The aggressively progressive policies of the Company will be continued and in no way will be affected by the change in officers. Harlowe Hardinge for the last sixteen years as vice-president and general manager has personally directed the affairs of the Company.

Mr. Hardinge was graduated from Cornell University in 1916 with a degree of Mechanical Engineer and entered the Company immediately afterward. During the War, as Captain in the Signal Corps in charge of radio training of the Air Service, Tank Corps, and Artillery, he was stationed in France for two years.

He has had a great number of patents granted in the field in which the Company operates, covering grinding, classifying, feeding, thickening, and drying equipment. His "electric ear" invention, a revolutionary device for controlling grinding by sound, has received nation-wide attention during recent months.

At the same meeting, Francis E. Finch was elected vice-president and secretary.

The present officers of the Hardinge Company, Inc., are as follows: H. W. Hardinge, *Chairman of the Board;* Harlowe Hardinge, *President and General Manager;* J. J. Cadot, *Vice-President and Treasurer;* F. E. Finch, *Vice-President and Secretary;* and R. S. Schmidt, *Assistant Treasurer.*

A NEW SILICA GLASSWARE

An entirely new method of glass manufacture yielding products which can be heated to cherry-red heat and then can be plunged into ice water without breaking has been developed in the research laboratories of Corning Glass Works. The Corning management has made it clear, however, that although the Research Department has completed its exploration into the unknown and has established its findings beyond doubt, it will be two years or more before the products can be offered to the public.

The achievement of this ultra low-expansion glass is one of those amazing dramas of industrial research in which advance signalings of the undiscovered facts appear fragmentarily like will-o'-the-wisps to various Corning investigators, in this case, over a period of sixteen years. It was found finally that these fragmentary indications were all pointing in the same direction. The weirdest point about the new and revolutionary process is that articles made by it shrink to less than two-thirds their original volume yet retain their identity and suffer no distortion of form. This means a linear shrinkage of 13%; for example, if a 9-in. dish is wanted, a $10^1/_2$-in. dish is first made.

A normal glass object, such as a plate or beaker, is made by the usual melting and molding operations, but a special glass formula is used. Through a series of treatments involving final leaching with dilute nitric acid, part of the structure of the glass is removed. Under further heat treatment the glass shrinks down to a volume which is 35% smaller than its original size. During the acid treatment, 36% of the body of the glass has been removed and 64% remains. The surface feels rough to the touch but does not feel porous. Actually, at this stage, it is filled with submicroscopic capillaries or air spaces. Upon final heat treatment, the glass body shrinks to a transparent, homogeneous state in which it is practically 96% pure silica. In this completed state, the glass can be heated to a bright cherry-red color and then dipped into a vat of ice water with no injury whatsoever.

The new glass will offer in an economical price range a material similar to fused quartz. It was just a hundred years ago, in 1839, when A. Gaudin, in France, showed that molten quartz could be worked like glass. A quartz crystal which is silicon dioxide, of which sand is a form, can be melted at the high temperature of the oxyhydrogen flame and in that manner can be formed into various vessels chiefly for laboratory use. The resulting silica glass stands sudden changes from hot to cold without appreciable injury. Fused quartz, or better, silica glass, has not been found adaptable to mass-production methods of fabrication, and therefore its application outside of specialty fields has been curtailed. The new glass product is for practical purposes equal to fused quartz or fused silica ware, and indications are that it can be manufactured by mass-production methods and at resultant low costs.

A miniature pilot plant has been operating for several months. To put the process on a full-scale basis would require at least two years, even assuming rapid designing and building.

To understand the significance of this development one must recall that in olden days glass expanded so much when heated and contracted so much when chilled that

it would break invariably when subjected to such extremes. Fused quartz is practically shock-proof thermally but is not a mass-production commodity. The chief difficulties in fusing quartz are (1) high melting point, (2) no suitable refractories in which to melt, and (3) the further fact that melting and vaporization points are close together. In price range it is relatively high.

The patent covering the new process was taken out by H. P. Hood and Martin E. Nordberg and was assigned to Corning Glass Works.

A technical description of the most important steps in the new Corning glassmaking method is as follows: The starting object, a dish, flask, beaker, or tube, is produced from certain original types of borosilicate glasses which are somewhat unstable. By means of a heat treatment these glasses are separated into two phases, one high in silica and highly stable, the other containing substantially no silica and very soluble in the common acids. This second phase is then extracted by leaching in an acid bath for some time, which leaves a skeleton-like structure of high silica glass. This is then fired at a vitrifying temperature to condense this structure, which is porous, into a clear, solid mass. It is during this final heating that the uncanny shrinkage occurs.

A comparison of physical properties is given in the accompanying table. The columns represent, respectively, (1) a typical glass made by the new method, (2) a good quality low-expansion glass made by previous methods, and (3) fused quartz.

PHYSICAL PROPERTIES COMPARED

	New glass	Previous low-expansion glass	Fused quartz
Softening point	1442°C	819°C	1667°C
Annealing point	931	553	1140
Strain point	857	510	1070
Max. temp. for use (for considerable period)	900 to 1000°C	500 to 600°C	1100
Density (sp. gr.)	2.18	2.23	2.21
Coefficient of linear expansion	7.8 to 8 $\times 10^{-7}$	32 to 33 $\times 10^{-7}$	5.5 to 5.85 $\times 10^{-7}$

CERAMICS IN GOLDEN GATE BUILDINGS

In the Pacific Building there has been built in the Theme Hall a map of the Pacific Ocean and the countries bordering it, all constructed of polychrome terra cotta. This map measures 27 by 43 feet and was made to show contours in color. It was designed by architectural draftsmen of the Golden Gate International Exposition and constructed by Gladding, McBean, & Company.

In the Old Mission Trails group of buildings, use has been made of faience in polychrome oil jars and tile in the fountains and stairs. The colors used are mostly greens, yellows, and lapis blue.

In the Alameda and Contra Costa Counties buildings, N. Clark & Sons have a fine exhibit of burnt clay products, such as pipe, paving tile, wall and roof tile, and terra cotta in various finishes.

In the California Building Patio, splendid effects have been obtained in the terraces by using 8- by 16-in. paving tile in siennas, umbers, etc., with a $^5/_8$-in. mortar joint between.

ENAMELING SCHOOL AT GOLDEN GATE EXPOSITION*

Visitors at the Golden Gate Exposition at San Francisco will have an opportunity to observe interesting types of art enameling and the unique "enameling school" being conducted there by Miss Molli Juin, West Coast artist and ceramist.

Miss Juin is skilled in the various techniques of enameling, such as cloisonné, champlevé, basse-taille, Limoges, plique-à-jour, open-cell, repoussé, and miniatures.

Combining modern art with ancient handicraft, she is able to manufacture an interesting variety of art objects and jewelry finished in colorful and interesting vitreous enamels. Miss Juin has had an extensive art training in Europe and America. She is a graduate of the Beaux Arts Academy of Paris, Arts and Crafts College of Vienna, New York Institute of Art, and has been a faculty member of D'Allession Academy of Design, New York, and the Schaeffer School of Rythmo Chromatic Design, San Francisco.

Many priceless pieces of enamels fused on solid gold plaques, which were created by Miss Juin as altar decorations in famous churches, can be seen throughout Europe and also in the Hawaiian Islands.

Limoges enameling originated in France, and it was in this country that Miss Juin spent much of her time studying her craft. According to history, the Limosin family was responsible for the perfection of Limoges enamel, which reached its height in the Sixteenth Century. Although the secret of the process was carefully guarded, it is generally known that powdered precious stones were used for pigments by the early artisans. For example, red was obtained by grinding actual rubies to a fine powder and adding water. This color was then carefully applied with a brush before the mixture dried. The piece was then baked in a specially designed kiln at an extremely high temperature. As the articles of jewelry which the Limosin craftsmen produced were for royalty, the use of such rare materials was possible.

In making Limoges enamel by the modern method, metallic oxides are used to take the place of precious stones for coloring the enamels. To produce a piece of Limoges enamel, the artist hammers out a shape from a sheet of gold, silver, or copper. It is then boiled for ten minutes in "Oakite" to remove all trace of grease or oil. Then it is washed with hot water and given an acid bath. After drying thoroughly, the piece is ready for the application of the enamel. Dried enamel (about 60-mesh) mixed with a small amount of water is applied by hand, using a small camel-hair brush. The design, of course, must be painted freehand as it is impossible to do any tracing in this type of enameling. The piece is dried and fused in an electric kiln at a temperature between 1500° and 1600°F for a period of three minutes.

The work of Miss Juin is on exhibition at the Golden Gate International Exposition, Treasure Island, San Francisco, where one may also see at her model school, the "Molli Juin Academy of Enameling," many students in the actual creating of Limoges-type enameling. Special electric kilns, equipped with pyrometric equipment, are on the tables, and the pieces are fired in full view of the public to show in detail the technique used.

* Reprinted from *The Enamelist*, **16** [8] 22–23 (1939).

GOLDEN GATE GENERAL MEETING, SAN FRANCISCO, CALIF., AUGUST 6–12

OFFICIAL HEADQUARTERS—THE PALACE HOTEL

Ceramic Day at the Exposition, Monday, August 7

KRAFTILE COMPANY EXHIBIT

The Kraftile Company Exhibit at the Exposition is a reproduction in terra cotta of an ancient Egyptian frieze which is the earliest representation of a dairy scene known to man in any form whatsoever. This reproduction originally was made for placement in the lobby of a new building of a large dairy concern, and in view of the interest displayed in the artistic qualities of this work, a call was received for permission to display it in the Alameda-Contra Costa Counties Building. A description which appeared on a bronze plaque that was placed below the original reproduction follows:

About 5000 years ago the Babylonians of Ur worshipped the milk goddess Nin-hur-sag. When her shrine at al-Ubaid was excavated by the Museum of the University of Pennsylvania and the British Museum, on the outer wall was discovered the panel here reproduced. It depicts two calves emerging from a reed pen, a man milking from behind the cow as was the custom at that time, two men straining milk and pouring it into a spouted jar, another making butter by rolling a jar between his knees, and a fifth packing it away. These men are priests performing ceremonies in honor of the milk goddess; the scene is the earliest known representation of dairying.

Ceramic Day on Treasure Island, Monday, August 7, Atholl McBean, Speaker at the Ceramic Dinner, Golden Gate Exposition, San Francisco, Calif.

OWENS-ILLINOIS PACIFIC COAST CO.

People who live in glass houses *may* throw stones if they like, especially if they reside in one of the modern glass-brick houses. These glass brick would shed a barrage of stones as easily as a tin roof would water. This was revealed in the Owens-Illinois Pacific Coast Company Exhibit in the Palace of Homes and Gardens at the Golden Gate International Exposition.

Ordinary house brick manufactured by this exhibitor will withstand 60 pounds pressure per square inch. They can also be made to permit as much as 86.5% of all possible light to pass inside or to shut out all but 20%.

The Exhibit shows extensive use of glass brick in industrial factories, schools, and all types of homes. The various brick may be streamlined, curved, oblong, or square and lend themselves well to any type of architecture.

COMMITTEES ANNOUNCED FOR CERAMIC WEEK AT EXPOSITION

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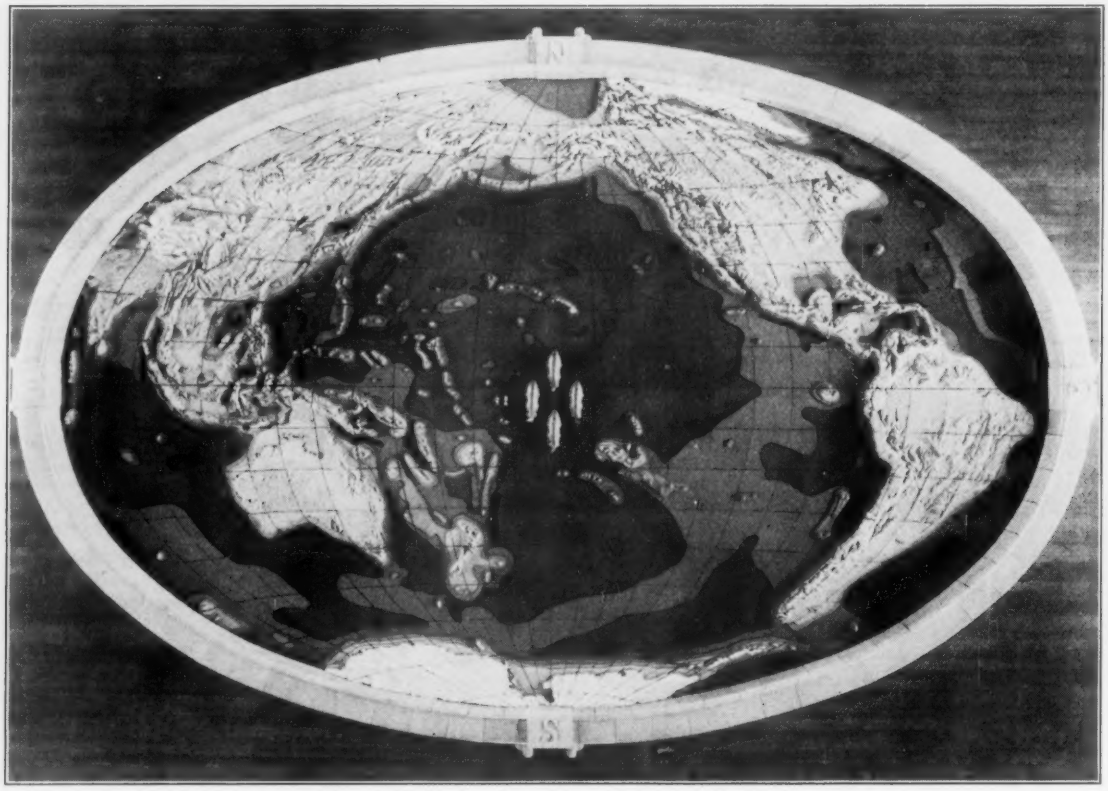

Golden Gate International Exposition: Terra cotta map of Pacific Ocean showing adjacent countries, etc.; built in Pacific Building (for description, see also February *Bulletin*, p. 62, 1939)

LIBBEY-OWENS-FORD GLASS EXHIBIT ON TREASURE ISLAND

The all-glass exhibit building of the Libbey-Owens-Ford Glass Company at the Golden Gate International Exposition is credited with being one of the most eye-arresting industrial displays on Treasure Island. It is not of the conventional industrial "exhibit booth" type. An all-glass bathroom in colors and an all-glass stairway built against a wall entirely of plate glass mirrors are featured.

The L-shaped building, 85 by 32 feet, is built within the vast Homes and Gardens hall and incorporates within itself the latest ideas for modern storefronts of glass and metal, the newest in structural and decorative trends for the home, and a carnival section wherein unique displays enable the visitor to have fun while testing the various unusual characteristics of the newer types of flat glass.

The Exhibit from the south entrance reveals a vista of towering panels of blue plate glass, the mirrored wall with the all-glass stairway, and toward the top of the "L," a luminous sign of white Vitrolux glass, 48 by 8 feet, with a group of window displays underneath and the carnival section occupying the adjoining space.

The window features a unique display of tools used by the skilled craftsmen of an older day when window glass and other types were blown in cylinder form by human lung power. Mirrored plate glass is used at the back and sides with plate-glass shelves; the lighting is diffused through a ceiling of white Vitrolux, a heat-strengthened plate glass which has finely powdered colored glass fused onto one surface.

A "torsion" machine invites visitors to test their strength in bending Tuf-Flex plate to the breaking point. A slab of Tuf-Flex is used as scales; above the weighing device is a photo-mural which shows the weight test for heat-strengthened glass, that of a three-ton elephant standing on a $^3/_4$-inch thick pane which bends but does not break under the severe live-weight load. When the visitor steps upon the same type of glass, but a thinner piece, the picture disappears and the person's weight is shown.

Much interest is aroused by the door of Vitrolite inlay glass in a variety of colors which leads into a private entry.

The glass stairway, from ground level to the second-floor office, appears twice as wide as its actual measurement. It has aluminum framing, with stair treads of $^3/_4$-inch thick unsupported Tuf-Flex plate glass. The landing at the top is of the same glass. The balustrade has $^1/_4$-inch Tuf-Flex, decorated with $^1/_4$-inch sandblasted stripes. The stairway has 7-inch aluminum channel stringers, which in turn support aluminum angles to hold the glass treads in position. The area at the bottom of the stairway has a ceiling of mirrored golden plate glass.

Back of the plate-glass show window is an exhibit symbolic of spring which features an artist's large palette with "paint daubs" made of various colors of Vitrolite slabs. This window display is changed from time to time to represent stores typical of Main Street everywhere. The back and sides of this display window are faced with silvered Blue Ridge Louvrex pattern glass.

An all-glass table, serving as a focal point for the lower front corner of the Exhibit, is set on a platform of black and ivory Vitrolite to enhance its display possibilities.

—Earl Aiken

Libbey-Owens-Ford Glass Company Exhibit

THE OFFICIAL SOCIETY KEY

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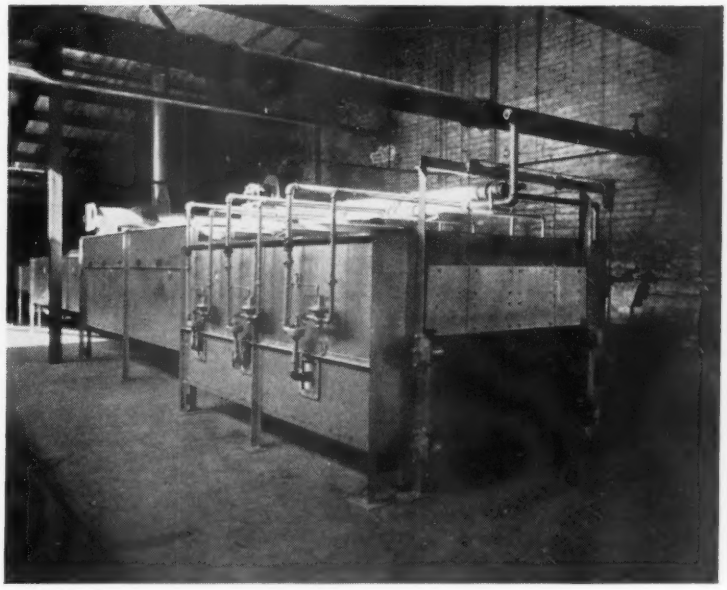

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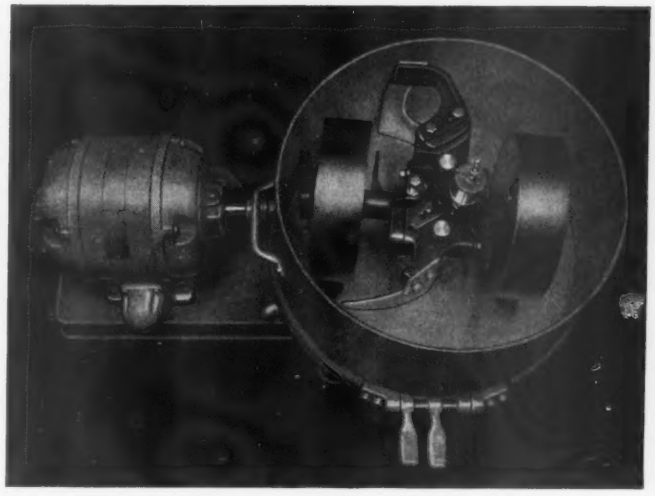

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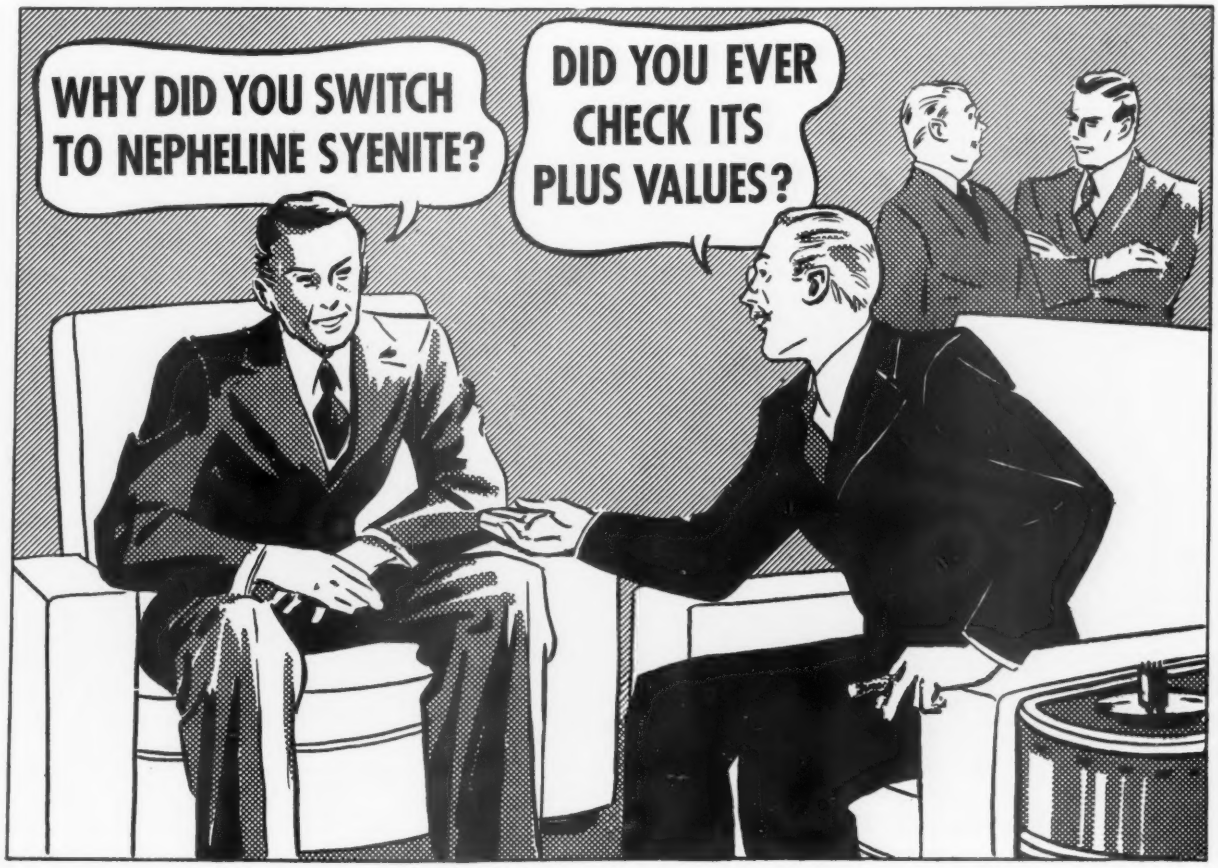

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